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JOURNAL

OF THE

ASIATIC SOCIETY.

Note of Discoveries of Gems from Kandahar.—By Lieutenant CONOLLY.

MY DEAR SIR, *Kandahar, October* 24, 1839.

In default of something more interesting, you will perhaps not think the enclosed facsimiles of gems unworthy of place in your Journal. They are sent rather, it must be confessed, with the desire of gaining information, than a hope of being able to impart it. The number of the Journal which contains the Pehlevi Alphabet not being procurable here, we are unable to read the inscriptions. Our harvest of antiquities has as yet been most unpromising. This is partly owing to the disturbed state of the country, but also in a great measure to our researches having been confined to the southern provinces of Afghanistan, to which the Greek rule and civilization would seem only very partially to have extended. From Shikarpore to Herat or Seistan there is hardly one stone edifice, and not one of antiquity. Pure Bactrian coins are very rare, and the only description found in any quantity, are coins having some connection with the Azos series; the most common being copper coins, with a head and illegible inscription on the obverse, with the Unadpherros reverse. Seistan, which we hoped would prove an Eldorado, furnishes, or has as yet furnished, nothing but these, together with numerous Sassanian and Arsakian coins. Of the Sassanian, the most common is a species not noticed in the Journal, but probably to be recognized in some of your numismatological works. Obverse, two heads, one with the usual Sassanian high cap and long beard, the other facing it smaller.

But leaving coins to a future opportunity, I proceed to lay before you the history of the gems forwarded.

1. A Buddhist (?) monogram on an agate, found at Kandahar.

2. A female with child, and a hawk in her hand. The figures on the margin, which might be mistaken for letters, seem rather to be birds; seals with this impression seem not to be uncommon; they have been found at Herat and Kandahar. The inclosed is from an agate.

3. A Victory: agate. Kandahar.

4. A do. with fillet and palm branch, do.

5. A seated figure. Rudely executed Pehlevi character? These are all of the collection of Colonel Stacy.

Major Leech allows me to send you the following:—

6. Similar to No. 2, Pehlevi letters distinct. Ruby.

7. Horse and rider; inscription indistinct.

8. Bacchus or Silenus?

9. A doubtful specimen, probably modern, representing a love scene from some of the innumerable tales, such as *Wamik* and *Oosra*, (a work which in spite of Van Hammer's boasted discovery, is common in Europe) *Adam and Door Khani*, &c. &c.

10. The most perfect and curious specimen of the collection was dug out of the ruins of the ancient Boonaka, upon which is now erected Nadali, the Mokum of one of the four chiefs of Seistan. This place affords innumerable relics of antiquity. Climbing up the old mound with two or three attendants, we found three copper coins in as many minutes. It is an agate seal with three faces, bored through so as to admit of its being worn round the neck. I will not venture a conjecture on the subject of the engravings. The head would seem to be Sassanian, while the peculiar position of the five fingers argue something mystical and Buddhistic.

11. Has perhaps some relation to the punja in the above; it belongs to Colonel Stacy.

The next five are also from the ruins of Boonaka, nearly the only place in Seistan which has as yet yielded antiquities. When the rain turns up the earth, the idlers hasten to the "Dujhulgurdi," as they call the rummaging of these old relics, and find large numbers of gems, small copper images of birds

and beasts, and copper, silver, and a few gold coins; the former chiefly Caliphate and Sassanian. A potful just dug up, was brought to us from Peeshawroon, but they were every one entirely destroyed by rust; we did not get one gold coin.

12. The Trisul, with a half-moon.

13. A very rude Buddhist sitting figure.

14. Brought on the same string with No. 10. Sculpture very rude. Obverse, apparently the Buddhist figure of the $\overset{0}{\underset{0}{0\,0}}$ series of coins; the other face, unless it be meant for two birds, I can make nothing of. Figures of birds and beasts on agate, cut on copper seals and imaged in copper, are found in such quantities in every old town all over Afghanistan, and so exactly similar, that they alone, if no other proof were at hand, would suffice to shew the former universality of the Buddhist creed. Animals of all descriptions are found.

15 and 16. Two copper seals have, the first, a griffin; the other a Brahmunee bull.

17. Is from a copper ring, which resembles in some points the circles of animals found in Ceylon, at Behat, &c. On it may be perceived the hog, cat, two cocks, &c. &c. It was probably dug up from the Eimak hills above Herat, which besides numerous small idols of stone and metal, furnish cylinders like those of Babylon,* with arrow-headed inscriptions. I regret to have at present none to send you. The reverse of 17 seems to represent flying figures.

18. Is a seal. Are the letters Cufic?

The next paper on the subject of the antiquities, will I hope be better worth your attention; just now I have nothing of interest to forward, and am much pressed for time, being here a mere traveller en route to Caubul. Yours sincerely,

KHAN ALI.

* Note.---One of these cylinders was with the permission of the owner, Major Pottinger, laid before the Society at the last meeting with a collection of gems and coins from Herat: I trust to have it in my power to compare it with a Babylonish cylinder. Drawings of it and some of the gems are under preparation by Lieut. Kittoe, who has with his usual kindness undertaken to enable me to insert them in the Journal.

Note on Kandahar Gems.

It is extremely mortifying to be obliged to submit these very singular relics to the readers of the Journal without any thing beyond a conjectural comment upon them. The gems themselves must be, many of them, extremely well executed, arguing the existence of a high state of civilization among the people, with whom they were in use. The drawings, taken from the impressions in sealing wax with which Lieut. Conolly has furnished me give, I should say, with one or two trifling exceptions, a very faithful, and accurate idea of the gems they are intended to represent. The figure of the Victory (No 4) might well compete in grace and spirit with the ordinary similar figures found on the ancient gems of Italy, or Greece. As the comparison by juxtaposition of one of such gems with the Victory might be thought interesting, I have inserted immediately below it a Jupiter (A) found at Civita Vecchia.* It is an agate, and the drawing has been taken from an impression in sealing wax, in order to put the European on exact par with the Asiatic antique. The result of the comparison is not, I think, to the disadvantage of the latter; and as the Jupiter has been, its possessor informs me, looked upon by competent judges in such gems as a good specimen, we may in a sort of vague manner assign a period to our Victory as having been produced under the purely Grecian dynasty of Bactria, when the arts of their fatherland were still cherished in something of their original beauty by the soldier-monarchs, whose arms constituted their right of empire.

The figures (as Nos. 2 and 6) belong evidently to a very different era, were even the execution alone the test by which to judge of them. The gem No. 10, again, is of a higher order of art, although bearing a *barbarian* legend: the head on one of the sides is cleverly cut, the hand on another well proportioned, and the characters of the inscription executed with much neatness. All speculation however on the style of workmanship as a test of the date of production of such gems is, for the present, idle. I have merely touched upon it, as believing that it may hereafter become a useful agent of verification, or even of discovery, when time, patience, and a larger experience in the varieties of these relics shall have given a clue to the assignment, or an approximation of the assignment, of their periods. That we may hope for this on sound grounds, I shall explain further on.

The monogram on No. 1, I had at one time thought to have proved to be, as Lieut. Conolly suggests, Boodhist; it is still under examination.

* Note.—It is the property of Lieut. George Reid, 1st Cavalry, to whose kindness the Society is indebted for the drawings of the gems published in this number, and without whose aid I could not have submitted a copy at length of the characters on them.

The figure No. 2, with the child, seems to me to hold not "*a hawk*," but a parrot, on her hand. The frequent occurrence of a similar gem gives room to hope that the personage represented (mythological in all probability) may be identified; and I the more incline to think this, because among the figures which Lieut. Conolly supposes to be rude representations of birds, I detect two distinct characters of the Pehlevi. May I beg the attention of our readers to this, and to the other inscriptions on these gems, and their aid in attempting to decypher them by means of the alphabets compiled (As. Jour. vol. iv. p. 360) with such care and accuracy by our late Secretary?

I may here mention, that we have now in Afghanistan the advantage of an invaluable assistant in such researches, I mean Major Rawlinson, whose recent discoveries at Persepolis, communicated to the Royal Asiatic Society, must rank among the most important historical acquisitions of this country. Major Rawlinson's patience, enterprise, and ingenuity, have been rewarded by complete success in decyphering the well known inscriptions at that ancient city, the records contained in which go to verify the accuracy of Herodotus with regard to a portion of the work in which the Father of History has been hitherto (from want of corroborative testimony,) supposed to be most open to doubt and objection. The exact correspondence is said to be such that it might not be a wild supposition, were one to entertain the idea, that these very inscriptions had been the sources of his information. Having achieved so much, there is ample reason to conclude that the same spirit of inquiry will be as ably directed in researches into the present mysteries of Pehlevi, as of late into what was the sealed book of Zend. I have indeed the gratifying assurance of knowing that Major Rawlinson is already engaged in applying his information to his present field of action, as I am now keeping back a most interesting paper on Seistan, by Lieut. Conolly, in order to have the advantage of notes and translations added to it by the accomplished scholar abovenamed. Under these circumstances I am justified in renewing my earnest request for information on all and every point of antiquarian interest beyond the Indus, in the deep conviction, that there do there exist the means of unfolding another page in the great book of the history of nations, with regard to countries, the "*officina gentium*," from of old to India. What of discovery as to the origin of the mixed tribes, and many peoples that inhabit the Peninsula, may not be elicited by a perseverance in research in this new and most interesting field!

Nos. 3 and 4 and 5, I need not notice; as regards No. 6 it is as well to observe that the figure there given, is not exactly similar to No. 2, as suggested by Lieut. Conolly. The child is held here on the opposite arm, and

the right hand is raised in a monitory attitude instead of supporting a hawk, or parrot. The legend I have given in the lithograph accompanying this paper (No. 2.)

No. 9, I cannot make out the meaning of; the figures of the goat and bullock are spirited and natural, while the human sitting figure, and another half-seen personage who appears to be offering a glass or cup, are so rude as to lead one to suppose they were purposely caricatured. The material on which this is cut is not noted.

The three-faced gem, No. 10, is indeed an exceedingly curious relic. The legend I have given at length to facilitate reference, as they do not show distinctly in the lithograph of the gem. As to the meaning of the figures and symbols, after exhausting all the inquiry and conjecture my limited opportunities will allow me to engage in, I would decidedly consider them to be Boodhist. The *head* might be (?) Boodh; the extension of the lobe of the ear in the figure, and the nature of the symbols appended on the other faces of the gem, might warrant the assumption. It is unfortunate that Mr. Csoma de Koros' excessive dislike for conjectural comments of this kind deprives me, as it invariably did our late Secretary, of his assistance upon the points now under consideration. But in the absence of other aid, I had recourse to the assistance of a very intelligent *Jotee*, or Jain priest, at present resident in Calcutta. He was originally from Dehli, has resided long at Lucknow, and has been about six years here. I was fortunate enough to find him out while making inquiries through certain Jains of respectability, who chanced to have him for their Gooroo. On showing him the impression of the head, and inquiring whether there was any ground for venturing to suppose that Boodh might be represented as with the *beard*, he decidedly negatived the supposition, and insisted that, though the other signs were Boodhistic, the head was not what I had suggested. Having however pointed out the elongated lobe of the ear, which had escaped his observation at first, he was struck with the circumstance, and after some further examination made the remarkable discovery of the supposed *beard* being the cloth wrapper which his sect place before the mouth, letting it fall over the lower part of the face when engaged in religious discussion, in holy rites, or in teaching on points connected with their doctrine. He appeared to be much surprised, and elated at this discovery, and did not entertain a doubt as to the identity of the head with Boodh. The supposed beard was in fact, until explained with reference to its proper representation, an almost insurmountable argument against the head's being what I would have fain supposed it. Captain Macleod, (of the Political Department) so long resident among a Boodhist population, had already in-

formed me of the impossibility of reconciling the bearded face with that of Boodh. I have again, and again, pored over the impression, and have examined it through a strong magnifier, with the hope, as may well be imagined, of being able to convince myself of the justness of the *Jotee's* supposition, but I must honestly confess, that I am by no means able to satisfy myself that he is right, though the line across the cheek may be taken as the edge of the cloth, which, when so worn, is fastened immediately behind the ear, in a straight line from the upper lip. My belief is, that the real explanation of the *head* is yet to be made.

The *hand* holds the position of what more than one very competent native informant, (among them Pandit Kamalakanta Vidyalanka), has described to me as a *Moodra*, or emblematic sign, common among Brahminical teachers. It is called the *Totwa Moodra*, and is used by the Gooroo while inculcating some doctrinal point, or explaining one of the mysteries of his religion to his disciple. Many of the readers of the Journal may doubtless have seen it used, and most of those at all conversant with the faith and habits of the Hindoos, will remember that Rama is ordinarily represented with the hand in this position. It is, in short, the sign of a religious teacher, or preacher.

It is also termed *Vyakhyana*, and among professors of the Brahminical doctrines is adopted on the authority of the following *Sloka* from the *Tantra Sara*.

दक्षिणाङ्गुष्ठ तर्ज्जन्यावग्रलग्ने परराङ्गुलीः । प्रसार्य्य सं'हतोत्तानां एषा व्याख्यान मुद्रिका ।। श्रीरामस्य सरस्वत्या प्रेयसीयं' सदामता ।।

This is translated literally, "The junction of the tips of the right thumb and forefinger, when disjoined from the other fingers, which are in a close and curved position, is called the *Vyakhyana Moodrika*. Know that this (moodra) is always an object, or source of pleasure to *Sree Rama*, and *Saraswati*, (Goddess of science and the arts.)" The *Moodra* is not less Boodhistic than Brahminical. With the Jains it is termed *Oopdesh, or Unyoog Moodra*, all the terms in use with the professors of these creeds, having one reference to *the instruction in, and inculcation of, essential truth.* Indeed the *Jotee* directly he commenced giving me information on the points discussed at our meeting, as if by involuntary motion, put his right hand into the shape represented on the gem, *covering his mouth with the left hand*, so as immediately to recall by the mere action the conviction that the veiled mouth (?) and curved hand of the gem could belong to no set of types, but that of which a living example was before me. *The triple-pointed symbol* I had from the first considered Boodhistic, and some authorities which I had consulted, induced me to believe that the lower part of it was the *trikon*,

or triangle representing *the earth*, and the three *points*, the pinnacle of Meru, forming with the *Sun* and *Moon*, a general type of creation. The *Jotee* however informed me that the whole symbol was typical with his sect only of the mysterious mountain, "*Shimmero Purbut*," or Meru, the which the Jains say is composed of four forests, the lower *Showmunsh banu*, "the flowery forest," the three upper ones, *Bhoodra shal banu*, *Pandooko banu*, and *Nundono banu*, "the fair sal forest, the yellow, and the pleasant forests." The Sun and Moon revolve, according to Boodhist faith, about the higher peaks, and are in this type of course appropriately introduced. Such is the explanation, which after infinite trouble, has been put together as a plausible commentary on the possible meaning of the figures on this remarkable gem. The inscription was of course a much more difficult subject of consideration, and under the impression that I had detected the Sassanian Pehlevi in its character, I persevered (with the aid of Mr. Reid) in attempting to read the letters by the alphabet of the language above named. I even conceived that there was so much similarity in the forms of the letters, according to the way in which I read them, as almost to justify my publishing as conjectural the fruits of our endeavours under the above, as it proved, mistaken impression. While dwelling on this idea, I chanced to make a reference as to the Brahminical adoption of the *Moodra* represented on the gem, and in the course of it, showed the impression to Pandit Kamalakanta Vidyalanka, as well as to other well informed Hindoos; among them, to my friend Raee Seetanath Bhose Behadoor, who was of great service to me in the subsequent inquiry. To my surprise, he (reading the character in reverse of the mode which I had attempted in inexperience of the art of decyphering) recognized so much of a decidedly Sanscrit character in the letters as to induce me to make over the impression to him for deliberate study. I had already discovered the exact similarity of the letters in two of the faces, but the result of the Pandit's inquiry proved all three to be the same, and the character (as given in the lithograph, No 1,) to assimilate very closely, if not positively to coincide, with the Sanscrit (Boodhist, 500, B. C.) of the celebrated Baroda inscription. (Vide Asiatic Society's Journal, vol.—p.—,) I have only assigned letters in the Nagree character to those of the inscription, which by actual reference to the lithograph of the Baroda writing, I have seen exist there in exact facsimile. The rest the Pandit admits slight variations in, though very confident of the correctness of his reading on the whole sentence. He makes it जगद्राजो भयालयो योजन लक्षम् ॥ (jagadrajo bhagalayo yojana lakshan) which may be literally translated, "*The mansion of both the Lords of the World* (Sun and Moon)

is a lakh yojana;" or by paraphrase might be read, "The site of the influence of the two lords of the world extends *(a lakh yojana)* eight hundred thousand miles." The *yojana* (the measure occurring, Captain Macleod informs me as *Yoozana* in the religious and geographical works of the Burmese) is made of four measures of two thousand fathoms, (*Dhonuk* the distance between the extremities of the hands extended.)

As respects the reading of the inscription, I think there is sufficient probability of correctness to justify its publication; but it will be observed that "ja," "ga," "na," and "lo," are the only exactly, or very nearly correspondent letters with those found on the Goojerat inscription. The compound "dra," (the third character of the inscription) is an arbitrary reading. "Ya," which Kamalakanta interprets to be the character which recurs three times in the inscription, the sixth, eighth, and ninth letters, resembles the "ya," of the Goojerat type, but is not *identical* in shape. "Bha," is the Goojerat letter reversed. "Ska," is in the gem very minute; it is a double letter, clearly defined in the Goojerat type; its supposed correspondent in our inscription is sufficiently similar to authorise our giving it this value. Pandit Kamalakanta insists strongly upon the correctness of his rendering, arguing from the context where the character is obscure; in the critical observations by him on the reading, which I have above abridged, he repeatedly dwells on there not being "the slightest doubt" of the correctness of his interpretation. I have thought it best to affect less certainty for obvious reasons; however it must be remembered that the *lakh Yojan* is the Boodhist circle of the sun's revolution, and that this is most distinctly written on that face of the gem, which bears the symbol of Meru with the sun and moon revolving about it, for though it occurs on both the other faces, the characters are carelessly written, and are comparatively indistinct. What the intent of appending this motto might be, remains to be considered with reference to the general description of the gem.

Supposing it possible (which I can hardly suppose), that the head may be considered as representing Boodh, we should, without a forced interpretation, see in the gem, the seal, or perhaps amulet, of some zealous Boodhist, who bore about him in these emblematic devices a constant remembrance of the universality of the doctrine;—for instance; 1. Boodh; 2. The hand inculcating his true doctrine; 3. Throughout the celestial (and terrestrial ?) system. The motto would have similar reference to the extension of the doctrine throughout "the mansion of the lords of the earth."

Supposing, however, the head to be that of a monarch, as the beard would not allow us to consider it that of a teacher, the repetition of the motto might lead one to suppose, that it contained some allusion to his name. Could he be some "*Jagad raja*," who by using the word in a double sense intended at once to celebrate his own name, and either allude to the

extension of his rule, or of his religion, or of both? The inculcation of the Boodhist creed expressed by the *Moodra*, and the allusion to the extension of that creed throughout created nature, would hold good, as bearing out this hypothesis, which seems for a conjectural explanation, as to a certain degree, of sufficient plausibility to bespeak attention. In the result of all the above tedious, and troublesome research, I would not venture to offer, as to this new field for investigation, more than a suggestion, as to possible meaning, It is my earnest hope. that criticism may be thus encouraged, correction of error induced, and true conclusion elicited.

The inquiry into the meaning of the symbols on gems found in Afghanistan, and the adjacent countries, shall be continued with all diligence.

The *Jotee*,* to whom I have so often alluded, has undertaken to give me references from Jain books of authority on all symbolic types, which he may be enabled to give an interpretation of. I have by me a collection of gems, the property of Major Pottinger, on the examination of which the *Jotee* proposes to enter at once. Mr. Conolly has supplied me with a second series of relics from the neighbourhood chiefly of Jullalabad, which although not so interesting as those now submitted, will nevertheless add, I trust, something to our stock of information. I must again earnestly beg for impressions at any rate of all gems---particularly of those bearing inscriptions---from the readers of the Journal beyond the Indus, and from those of their friends, who being possessed of such relics would be kind enough to allow them to be made use of. Gems from Nadali (Boonaka) would be of great value.

The character numbered 2 of the lithographs I have not, after the signal failure in giving a Pehlevi version of the other, ventured to give a rendering of. It continues under examination, with, I fear, small hope that it will be decyphered. The wax on which the impression is taken is so bad, that this alone has made the tracing of the letters difficult. They are from No. 6, the monitory female figure, with a child. The execution of the figure I have already observed on; the characters are cleverly done, and assimilate to those of No. 10.

On the remaining Nos. I have no observation to offer in emendation of Lieut. Conolly's, to whose zeal and intelligence the Society is once more deeply indebted. It will be observed that *five* of the impressions he notes in his letter do not appear in the lithographs. One or two appear never to have reached their destination, and the others I did not receive when taking charge of the papers of the Society. I hope however to receive them on some future occasion.

* I would gladly have given the name of this very intelligent and obliging person, had I been enabled; but it is with the Jain priests a practice *never to tell their name.* Many of the Hindoo religious have a somewhat similar scruple, but not to this extent. On requesting the Jotee to allow me to mention his name in the Journal, he was silent, and would not speak for several minutes He afterwards told me that *no Jain should ever utter his own name, or speak of his own actions.*

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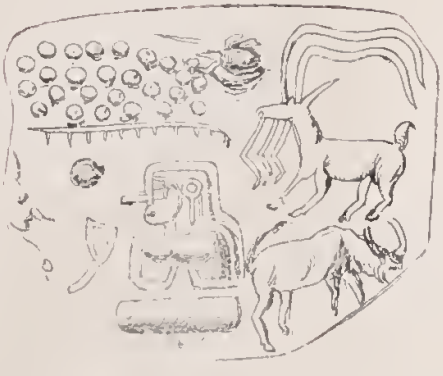


8

10

11

J. Geo. Reid del.

Asiatic Lith. Press T. Black Lithr.

14.

14.

16

17

17

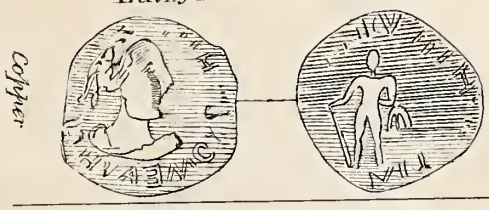
17

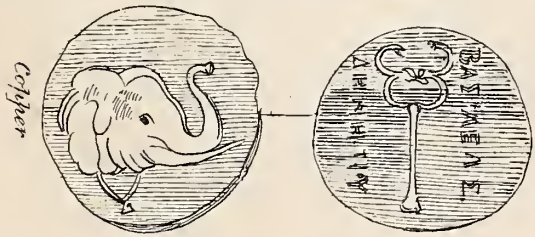
Inscription at Pinjore in Nagree.

सिद्धिः॥ संभुज्यभूपएवेत्थंजनितापरभूमिपः
श्रीलषण्डरमण्डल्यःश्रीकंदर्प्पप्रतिष्ठितः
॥ श्रीसीथीचाचा॥ ठकुरश्रीछत्रकः॥ठकु
रश्रीनपरकुदुड्डुल॥ श्रीललरदर पक

क	कु	च	छ	ज		ज्य	ठ	ड	ण त
ka	ku	cha	chha	ja		jya	t'	dá	ná ta
क	कु	च	छ	ज		ज्य	ठ	ड	ण त
प	भ	म	य	र	ल	द	थ	न	स
pa	bha	ma	ya	va	la	da	tha	na	sha
प	भ	म	य	व	ल	द	थ	न	स
ष	श्री	ए							
sa	sri	a							
ष	श्री	ए							

Euthydemus. Baemean





Demetrius. Baemean

T. Black, Asiatic Lith Press.

A Second Memoir with reference to the Theory of the Law of Storms in India; being, Researches relating to the Storm of the 19th to the 21st September at the head of the Bay of Bengal; to the Great Hurricane at Coringa on the 16th November, 1839; and to another off the Island of Preparis on the 22d November. *By* HENRY PIDDINGTON.

PART I.

My first Memoir on this subject, published in the Journal of the Asiatic Society for July and August 1839, was occupied with the Gale and Hurricane of 3rd to 5th June of 1839, with some theoretical and practical deductions. In the present, I propose to consider the tempests which occurred in the Bay of Bengal, between that epoch and the close of the same year. The first of these is the Gale of 19th to 21st September 1839.

The authorities from which my information respecting it is derived, are the logs and reports of about fourteen ships, Pilot, and Light Vessels, and 10 or 12 reports from inland stations, which have reached me through the Secretary to Government, pursuant to the notice published in the newspapers on 11th September, 1839.

I proceed, as in the first Memoir, to place upon record the materials, abridging them when necessary; after which I shall arrange them in a tabular form for each day, so as to afford thereby at a glance, as well as by the chart, a synoptical view of the progress of the storm.

No. 1.—*Extract from the Log of the H.C. Steamer "Enterprise," Capt. C. H. West; in the Bay of Bengal.*

Wind.	
SW. to WNW.	*Tuesday, 17th Sept.* 1839. P.M. Freshening breeze and clear weather. At sunset fresh WSWesterly breeze and cloudy weather. At 10 P.M. succession of heavy squalls from SW. to WNW. with vivid lightning. At 4 A.M. strong breeze with heavy squalls; throughout the forenoon constant heavy squalls; all sails furled, and the engines working from 8 to 10 revolutions. Sun obscured. Latitude per log, 13° 22′ N., longitude per log, 84° 50′.

Wednesday, 18*th Sept.* 1839. P.M. Fresh gale from the SW.
Wind. with a high sea, and the vessel labouring very much. At 4 P.M. set the fore topsail, double
SSW. reefed; and the mizen close reefed; sighted a brig scudding under her foresail, steering to the NE. At sun-set, fresh gale and squally. At midnight, increasing gale and
WNW. to SW. cloudy weather, with a rising sea; vessel labouring much. Carried away the wheel ropes; rove new ones. At daylight split the fore try-
West. sail; lowered it to repair. At 7 A.M. set ditto again, but close reefed. At 8 A.M. heavy gale, with very high sea. At 10½ A.M. pitched the jibboom in, and carried it away; and on the vessel sending to the same sea aft, stove the
WbN. jolly boat over the stern, filled her with water and nearly carried her away altogether; got her in over the stern. At noon heavy gales and thick cloudy weather, with a high sea. Sun obscured. Latitude per log 13° 14′ N., Longitude per log, 84°46′ E. The engines during this twenty-four hours at 5 to 9 revolutions.

Thursday, 19*th Sept.* 1839. P.M. Unbent fore trysail and
WNW. bent the new one. At 4 P.M. strong gales with heavy squalls and rain. At 6 P.M. ditto weather, and high sea; drift about 1½ to SW. At 9 P.M. during a heavy squall, the roping of the new fore trysail gave way; lowered it for repair. At midnight more moderate, and to all appearance the gale breaking. At 1h. 30m. A.M. the moon set, when the gale raged as fierce as ever in heavy squalls. At daylight heavy gales, with a high topping sea. Vessel labouring
SWb. heavily. Close reefed the main sail in case the mizen should give way; drift about one mile to the NW. At 9 A. M. gale increased, with high topping sea. Noon heavy gale with hard squalls and rain. Got the sun between the squalls.

Latitude by observation 13° 18′ N., longitude per log, 85° 10′ E. Engines working at 6 to 10 revolutions this twenty-four hours.

Friday, 20th Sept. 1839. P.M. Heavy gale with very high sea; got a preventer tackle on the fore mast; during the last 16 hours kept vessel close to the wind, with only the mizen set, and the engines working from 6 to 9 revolutions. At 8 P.M. more moderate. At midnight decreasing gale and clear. A.M. Moderating, but still a heavy sea running. Noon, clear. Latitude obs. 13° 33′ N., long. per Chron. 85° 35′ E.

SW. and SW by S.

The 21*st.* 22*nd.* and 23*rd.* P.M. Squally at times, and the sea continued till we approached to within 60 miles of the land. The barometer only fell 4-10ths of an inch during the gale. At Madras they had no wind, but a very heavy surf and torrents of rain. On the 25*th* we reached Madras, and found every thing smooth. During two days after the gale we put the fires out, and set all the sail we could, but the current was so strong to the eastward that we could make no way. We experienced a strong southerly current after leaving Madras, and we heard they had had a very strong gale off Coringa, but I could not learn in what direction.

No. 2.—Extract from the Log of the Barque "Isadora," Capt. G. Hodson; along the Coast from Vizagapatam to Calcutta.

On the 15*th September,* at anchor in Vizagapatam Roads. First, and middle parts light SbW. winds and gloomy weather; latter part strong SSW. winds and clear.

16*th.* Ditto ditto winds and weather.

17*th.* Steady, and strong SSW. winds, with showers of rain throughout.

18*th.* Ditto moderate NW. winds, veering to NNE. and cloudy weather.

19*th*. Ditto NNW. winds and dark gloomy weather, with rain. Weighed for Bimlipatam.

20*th*. Ditto NNW. winds and cloudy weather.

21*st*. Ditto SW., W., and WNW. winds, and hazy weather. Weighed for Calcutta.

G. HODSON.

No. 3.—Abridgment of the Log of the Brig "Spy," Capt. C. R. Smith, from Rangoon towards Calcutta. Reduced to Civil time.

On the 18th September.—At noon in lat. 18° 40′. N., longitude 88° 48′. E. Light steady breeze at east, with cloudy weather, continuing till midnight. Steering to the NNW. and NbW. At midnight wind EbN., squally.

19*th September*.—At 4 A.M. threatening appearance to the NE. Daylight, fresh gale EbN. with a swell from the NE. At 8h. increasing gale; shorten sail at 10h.; sounded in 60 fathoms. Noon *more moderate;* made sail; heavy swell from the NE.; wind EbN. lat 20° 36′ N., longitude 88° 01′ E. P.M. Moderate breeze, but cloudy; swell from the NE., stood to the eastward. At 5 P.M., threatening to the NW. battened down fore hatches. At 6, heavy thunder and lightning, wind NE.; midnight moderate and cloudy, with lightning to the westward. Heavy swell from the NE., vessel pitching heavily.

20*th September*.—1 A.M. Heavy gusts from NW. In fore topsail; hove too. 6 A.M. wind NNW. more threatening appearance; gale increasing to noon from the NW.; hove too under close reefed main topsail, in 45 fathoms water. No observation. Latitude by account and soundings 20°44′ N., longitude 88° 18′ E. P.M. Fresh gale, heavy swell from the northward. At 5 P.M. having stood to the westward, no ground 70 fathoms. At 10 set the foresail; swell from the northward; much water tumbling on deck with the roll of the vessel. Midnight moderate gale and cloudy; swell from the NW.

21*st September*.—4 A.M. High confused sea; less wind; vessel labouring very heavily. At 5, wind from SW. with a heavy sea. At 8, no ground 70 fathoms. At 10, soundings in 55 fath-

oms. Noon, fresh breeze and cloudy. Lat. obs. 20° 53′ N., longitude 88° 35′ 30″ E. P. M. Steady breeze, and heavy swell to the SW. Vessel rolling heavily, and much water washing on board. At midnight the Floating Light NEbN.

On the morning of 22*nd* got a pilot, and stood in with moderate weather.

Capt. Smith remarks at the close of his log—" I do not call the weather we experienced during these dates a gale; should I have been outward bound, I am pretty sure that the " Spy" would have gone through it with double reefed topsails, reefed courses, close-reefed boom mainsail, and fore topmast staysail. No doubt we should have felt it with this sail, but what I got of it was nothing to speak of, with the exception of a lot of water tumbling in upon our decks, we being deep, and I suppose within the influence of the lateral tides off the Sand Heads at the fall of the freshes, which must have occasioned this. My longitudes, I have reason to know, are perfectly correct."

No. 4.—H. C. S. " Amherst," Capt. Paterson, at anchor, Kyouk Phoo Harbour. Civil time.

18*th September*, 1839.—At sunset wind south, squally and heavy rain. 8 A.M. Bar. 30.3; midnight SE. light breezes, cloudy and rain.

19*th September*.—A.M. Light breezes SE. At 3, a heavy squall. At 4, strong breezes ESE. and heavy rain. At 8 the same; noon SE. squally and rain. At 3 P. M. Bar. 30.2; sunset to midnight strong breezes and squally.

20*th September*,—A.M. Strong breezes SE., and squally with rain. At 3 a heavy squall from SE. with pouring rain. At 4, the same, Bar. 30.1. At 8 squally with rain. At noon wind south, more moderate. Sunset, ESE. squally and rain. Midnight, SE. squally and incessant rain.

21*st September*.—A.M. SE. squally, with incessant rain. At 4 the same. At 8 moderate with incessant rain and thunder. Noon, south; moderate incessant rain. Sunset and till midnight cloudy, squally and rain. Bar. 30.

No. 5.—Captain Elson, Master Attendant of Chittagong, in his report of 27th December, says—

"On the 19*th* and 20*th September* we had a severe gale here, which lasted about 24 hours; that is, the severity of it did, it was not accompanied with rain. The wind principally held between east and south, veering towards the conclusion to the SW. as all gales do on this coast, when they break up."

No. 6.—Abridgment of the Log of the Barque "John William Dare," from Chittagong towards Calcutta. Reduced to Civil time.

18*th September*, 1839. Noon, moderate breezes from the SE., clear weather. Lat. 20° 36′. N., long. 90° 20′ E. Bar. 29.50. Ther. 86°. Steering to the SSW. and SW. The wind SE. and light, freshening towards midnight. At 11° 30′ squally and rain.

19*th September*.—7 A.M. Hauled up to the westward; wind ENE. Noon, strong breezes with passing squalls and showers of rain. A heavy sea from the SW.; ship rolling heavily. Lat. obs. 20° 6′ N., longitude 88° 15′ E. Bar. 29.39. Ther. 86°. P.M. Strong breezes, cloudy weather, and a heavy swell from the WSW. At 5-30 Point Palmiras WbN. distant 12 miles. At 6h. 25 fathoms water. At 8h. heavy thunder and vivid lightning, with a most dismal appearance. The Barometer falling; prepared for bad weather. At 9h. heavy squalls with thunder, lightning, and rain. Midnight, heavy gales; in fore topsail.

20*th September*.—8 A.M. Increasing gales from NW. Hove too under close reefed main topsail. Noon, Bar. 29.20. Ther. 83.30. Lat. by estimation 20° 10′ N., longitude 88° 10′ E. P.M. Heavy gales from NNW. with showers of rain. 4 P.M. gale abating; Barometer rising fast; made some sail. Midnight, Bar. 29.35.

21*st September*.—Daylight, moderate and fine. At noon, Bar. 29.45. Ther. 86°.

No. 7.—Extract from the Log of the Ship "Emerald Isle," Capt. Saunders.

For several days previous we experienced constant light, baffling airs, at SW. to East, with hot sultry weather.

September, 19*th*.—P. M. Lat. in 20° 41′ N., long. by Chro. 89° 27′ E. moderate breezes, veering at NE. to east, with partial

passing showers. Sunset, pleasant breezes and fine weather, with a clear horizon. Midnight, increasing breezes. 2h. 30m. A.M. entered the Eastern Channel with the Floating Light ship bearing W½S.; increasing breezes with light showers, wind as above. Daylight entered the Gasper Channel, wind veering at NE. to ENE. and dark cloudy weather. 8 A.M. pleasant steady breezes at NE. with passing clouds. At noon, fresh breezes and cloudy.

20th.—4 P.M. Squally, with passing showers, sky bearing a threatening appearance to the north and east. At 5h. increasing breezes; in topgallant sails, and sent royal yards on deck. At 6h. blowing very strong in puffs, with a heavy threatening appearance to the north. At 6-30 clued up and anchored off Kedgeree Lighthouse. At 7h. experienced a very hard squall from NNW. Constant rain and fresh gales from this time up to midnight. 2 A.M. squally, with severe gusts at times; less rain, and clouds more dispersed; towards daylight fresh gales and heavy rain. Wind at WNW. or NW. At 8, ditto gales and weather. Noon, less rain, but blowing very strong.

21st.—4 P.M. Sky thickening to the NW. and no appearance of the gale breaking. Sent topgallant yards on deck. Sunset, fresh gales at NW. with heavy rain. At 8 P.M. wind more westerly; ditto, gales and weather. Midnight, wind at west, and the weather somewhat broken, and beginning to brighten up to the westward. 3 A.M. Blowing strong at west, but every appearance of fine weather. Daylight, pleasant fresh breezes and fine weather. At 8 A.M. wind at WSW. and a clear sky.

No. 8.—*Capt. Bond, Master Attendant at Balasore, in his report to Government, says*—

At Balasore on the 18th September, the Thermometer stood at 87°. Wind SE. with slight sleety rain, light breeze.

19th.—At 86°. Wind NE. cloudy, with a fresh breeze.

20th.—At 83°. Wind NW. flying clouds and slight rain.

21st.—At 84°. Wind NW. ditto ditto very slight rain.

22nd.—At 87°. 30′. Wind SE. clearing up in rain.

N.B.—Barometer broken.

"I was outside in the Roads in the schooner Orissa on the 19th September, wind NE. with cloudy weather. Ran over to Piply. Finding the breeze freshen, with every indication of a gale, ran back

during the night to Balasore, having treasure on board; and anchored under the lee of the Surtah hills. 20th. A.M. wind shifting to the NW. ran for the Chooramun Mud. Cloudy, with a threatening appearance, but finding the wind pretty steady, ran again to the eastward, abreast of Piply. Continual heavy rain, with strong gusts of wind, till 10 P.M. when the wind lulled. Found a Telinga brig ashore at low water off Balasore. On the morning of the 21st. wind SE. and clearing up. Found on my return to Balasore that the want of rain had injured the crops to the westward of Piply, right south to Pooree; whereas to the eastward of Piply they had abundance of rain, and crops good."

No. 9.—Ship "Isabella Cooper," at anchor at Kedgeree. Captain Salmon's note to me, says—

"In answer to your note respecting the weather, the ship Isabella Cooper was laying at anchor at Kedgeree with 60 fathoms of chain out, and royal yards up. From the 18th to 21st September strong breezes with heavy rain, thunder, and lightning; while blowing fresh, winds from North to NW.

J. SALMON.

Barometrical observations on board the H. C. L. V. "Hope," Capt. Hudson; at the Inner Station.

18*th Sept.* Time.	Bar.	Ther.	Remarks and Weather.
8 A. M.	29.70	84	Light airs, clearing up.
Noon,	, 70	87	Calm. Hot.
8 P. M.	, 68	85	Moderate Easterly breeze.
19*th Sept.* P. M.	29.60	84	Moderate. NE. heavy threatening weather.
Noon,	, 70	86	Ditto, ditto, Cloudy.
4 P. M.	, 50	86	Strong NE. breeze; tremendous swell; threatening from Eastward.
8 P. M.	, 52	83	Unsteady, squally.
Midnight.	, 52	81	Frequent gusts at NNE. and unsettled weather.
20*th September.*			
8 P. M.	29.42	80	Blowing hard in heavy gusts. NNW. threatening.
Noon,	, 43	81	Strong NNW. breezes with hard squalls do.
4 P. M.	, 32	81	Continued heavy squalls; constant rain. *Barometer falling!*
8 P. M.	, 46	80	Apparently clearing up. Bar. rising fast.
Midnight.	, 49	81	Ditto, Weather.
21*st September.*			
8 A. M.	29.53	82	Moderating; frequent squalls from WSW.
Noon,	, 51	84	Fresh WNW. breezes; gloomy weather.
8. P.M.	, 61	85	Light SW. breezes and cloudy.

Tabular view of the Gale of the 19th to 21st Sept., 1839, as experienced along the River, from the Pilot and Light Vessel stations to Calcutta.

Date.	Vessels' Names.	Situation.	Wind, Weather, and Remarks.
18th Sept., 1839.	Saugor, P. V. ..	Eastern Channel and Saugor roads, ...	First part Light SE. breeze and fine weather, noon ENE. and cloudy to the eastward, latter ENE. light breeze and squally.
	Cauvery, P. V...	From Bankshall, to near Kedgeree, ...	Light breezes and fine weather.
	Jane, P. V. ..	A little below Point Jelly, ..	Wind from SEbS. very light, frequent rain at night.
	Hope, F. L. V.	Inner station, Gasper Buoy WbN. Lower Buoy SSE. Upper Buoy NbW.	On 17th Light Southerly and SSE. breezes, &c. and calms, cloudy to the eastward and lightning to NE. and N. On 18th 5 A.M. light squalls NE. to East, and constant heavy rain and calms and rain, clearing up. Noon, Southerly, calm; hot sultry weather, clouds rising all round. Sunset, light variable breezes S. to E., clouds to NE. a swell on, increasing; 8 P. M. moderate easterly breezes, tremendous heavy swell setting in from southward and eastward with a strong westerly set. Weather assuming an unsettled appearance. 9h. 30m. P. M. passing squalls, wind all round. Midnight moderate NE. breezes, heavy clouds all round; passing rain, lightning to the northward and heavy swell.
	Krishna, P. V...	Under weigh in the Eastern Channel, & at anchor 9 faths., F.L. Buoy E½ S. F.L. EbS.	First part light airs and calms; middle, pleasant easterly breeze; latter, freshening easterly breezes.
	Beacon, L. V...	Outer Station, ...	On the 17th Light SW. breezes veering to S. and SSE. cloudy and lightning. At midnight of that day to noon on the 18th varying from SSW. round to ESE. and becoming squally; at 8 P. M. increasing breeze from ESE; and at midnight wind veering from NE. to ESE. with rain and unsettled weather.
	Megna, P. V. ..	Near the Floating Light Buoy, ESE.	First part calms; middle, variable from E. to ESE. cloudy and rain; latter, fine weather.

Having drawn up the reports from the H. C. Pilot and Light Vessels in a tabular form, I have printed them so as to give the best view of the Gale along the course of the river to Calcutta.

Date. Civil time.	Vessels' Names.	Situation.	Winds, Weather, and Remarks.
19th Sept. 1839.	Saugor, P. V.	Kedgeree Roads and Lloyd's Channel.	First part pleasant ENE. breezes and fine; noon, moderate NNE. and fine; latter, heavy squalls ENE. to North, heavy rain.
	Cauvery, P. V.	Kedgeree Roads, ...	First part Light NNE. breeze, increasing to moderate Northerly breeze, and cloudy; at midnight squally from NE. with rain.
	Jane, P. V.	A little below Point Jelly.	Wind from SSE. very light; at 8 P. M. a squall from ENE.
	Hope, F. L. V.	Inner station as on 18th.	A. M. Weather clearing up; 4 A. M. fresh East to NE. breezes, with gusts at times, cloudy and squally, and heavy swell. Daylight, gloomy unsettled weather and moderate at NE.; heavy clouds, threatening appearance from E. to SE. heavy swell continues. Noon the same. 4 P. M. strong Northerly breezes, tremendous heavy swell; threatening appearances from East to South. Sunset the same; 8 P.M. moderate Westerly winds ESE. to ENE. with squalls, gusts of rain, and very unsettled appearance to SE., 126 fathoms cable out; midnight, frequent gusts at NNE. with dark clouds all round, lightning from West to NW. and threatening appearanee; swell continuing.
	Krishna, P. V.	Under weigh in the Eastern Channel.	First part variable from East to ENE., middle and latter NE. blowing a moderate gale from NE. First and middle part fine weather, latter squally with rain.
	Beacon, L. V.	Outer Station.	From midnight till noon, fresh to strong ESE. breezes, cloudy, and threatening, with rain and a heavy swell from the Eastward; at 4 P. M. increasing ESE. to NE. and NNE.; dark cloudy unsettled appearances to the East, swell continuing.—5 to 8 P. M. and till midnight, moderate gale blowing hard from E. to ENE. and NE. heavy squalls of wind and rain, thunder and lightning, all round; swell continuing; vessel pitching and shipping much water; veered to 165 fathoms.
	Megna, P. V.	Near the Inner Floating Light.	First and middle parts light breezes E to ESE. and squally; latter fresh breezes and cloudy.

Date Civil time.	Vessels' Names.	Situation.	Winds, Weather, and Remarks.
20th Sept. 1839.	Saugor, P. V.	At anchor Eastern Channel, 8 fathoms. Floating Light ENE., ..	First part heavy squalls from Northward to NE. with heavy rain. Noon hard squalls from N. to NW. and rain; latter part blowing hard from NW. to WSW. with rain.
	Cauvery, P. V.	Between Kedgeree and the Lower Floating Light, ...	Daylight moderate NE. with cloudy weather; noon, strong NE. breeze with rain; latter strong NW. breezes and rain; midnight, squally with heavy rain.
	Jane, P. V.	At anchor 6 fathoms and proceeding up, ...	First and middle parts strong breezes, with squally and heavy rain. NE. to NNW.; latter strong, with rain from N. to NW.; throughout the day strong gales NE. to NW.
	Hope, F. L. V.	Inner Station, as on 18th, ...	4 A. M. strong gusts at North, with dark, cloudy, and very threatening weather all round, passing showers and heavy sea; daylight the same. Barometer still falling and blowing hard at NNW. with very heavy gusts at times; weather very threatening and heavy sea. Noon, strong NNW. breezes with hard squalls; rain clearing off, wild, threatening appearances, confused sea. 3 P. M. blowing a gale, with frequent heavy gusts and constant rain; made all snug for a gale. 4 P. M. continued heavy squalls and constant rain; Bar. still falling; 180 fathoms cable out. 6 P. M. the same weather, clearing a little. Bar. rising fast. Midnight the same weather, and very heavy sea.
	Krishna, P. V.	At anchor 9½ fathoms F. L. NEbE.	First part NNW.; middle and latter, NW.; blowing a moderate gale, with heavy squalls and rain.
	Beacon, F. L. V.	Outer Station, ...	A. M. Gale continuing blowing hard from ENE. to NNE. with heavy squalls of wind and rain, very unsettled appearance, and heavy swell. 4 A. M. the same. 8 A. M. gale continuing blowing hard from NNE. and NW. heavy squalls. Noon, gale continuing NNW. & WNW. with heavy squalls. 4. P. M. gale continuing from WNW. 8 P. M. do.; midnight the same from WNW. blowing hard squalls of wind, light showers and cloudy weather.
	Megna, P. V.	At anchor F. L. bearing SSW. ..	Throughout hard breezes from N. to WNW. and cloudy, with heavy rain at intervals.

Date Civil time.	Vessels' Names.	Situation.	Wind, Weather, and Remarks.
21st Sept. 1839.	Saugor, P. V.	Reef Buoy NWbW., and latterly Saugor Light East, in 9 fathoms.	First part fresh WSW. to SW. breezes and squally, with rain; noon, moderate WSW.and fine; latter, light SW. breeze and fine weather.
	Cauvery, P. V.	Eastern channel, Floating Light E½S. 9 fathoms.	SW. breeze and fine weather.
	Jane, P. V.	Off Bankshall.	First and middle part strong breeze and rain, WNW. to SW.; latter moderating.
	Hope, F. L. V.	Inner station as 18th.	1 A. M. Wind shifted to West, blowing hard at times. Daylight, blowing hard in gusts, with threatening appearances SE. to SW. with lightning &c. weather moderating; heavy squalls WSW.; heavy sea. Noon fresh WNW. breezes with cloudy and gloomy weather; 8 P. M. light SSW. breeze, unsettled appearance all round, lightning to the westward, sea moderating; midnight light SSW. breezes, cloudy, unsettled. At 4 A. M. 22d, fine weather, wind WSW.
	Krishna, P. V.	Under weigh on the Eastern reef, and at anchor upon it, in 7½ fathoms, F. L. cast.	2 A.M. Wind shifted to WSW., weather moderating; first part fresh WSW. winds and cloudy and hazy weather; middle, moderate westerly breeze and fine; latter, light westerly breezes and fine.
	Beacon, F. L. V.	Outer Station.	A. M. Gale continuing, blowing hard from WNW. in heavy squalls of wind and light showers of rain. 4 A. M. Do. of gale broke, with a fresh WSW. breeze and fine; swell continuing; noon, moderate, WSW. and fine weather; 8 P. M. light WSW. to SW. Midnight, light SW. breezes.
	Megna, P. V. ...	Under weigh on the Eastern reef.	First and middle part fresh breezes from W. to SW. and cloudy; latter light airs from S. to SSW. and fine.

At Calcutta.

The following observations on the Gale, as it occurred at Calcutta, are my own, taken in a rather confined situation in Park Street, Chowringhee. The barometrical observations are my own and those of the Surveyor-General's Office, my barometer being corrected to the standard one.

Sept. 19*th.*—4 P.M. Bar. 29.48. The day mostly calm, hot, and cloudy; towards evening heavy dark *cumuli* and *nimbi* to the eastward, with lightning at times. 9 P.M. Bar. 29.47, wind ENE. dark gloomy weather; drizzling rain, and low moaning breeze throughout the night, with squalls and rain at times.

September 20*th.*—6 A. M. Wind NE. Bar. 29.44. Dirty drizzling weather, with a sighing undulating wind. 10 A.M. Wind NNE. Bar. 29.45; heavy rain and strong squalls at times. *Noon*, NNE. to NE. Bar. 29.37. Strong squalls and rain, heavy scud flying from the NE. 2 P.M. NNE. Bar. 29.33. Squalls, but almost calm at intervals, with heavy gusts, and rain. 5 P.M. Wind north. Bar. 29.33. Strong gale and heavy rain. 6 P.M. NNW. Heavy squalls and rapid scud from NW. 7 P.M. *Calm!* Bar. 29.34. At 9, wind NNW. Bar. 29.37 P.M. Strong squalls and rain. *Midnight*, NW. with heavy gusts and rain.

September 21*st.*—5 A.M. SW. Bar. 29.43. Squalls and rain. 9 A.M. SW. Bar. 29.49. Clearing up. 11 A.M. Calm. At noon the gale terminated. Bar. 29.50, drizzling rain and squally from W. and SW.

Throughout this Gale the clouds were always, so to speak, before-hand with the wind below them. When the wind was at NE. the clouds were moving from NNE., and by the time the wind arrived at North, or very little to the west of it, the scud was flying from NNW. or NW., and again from West, or nearly, so while the wind was yet at NW. shewing that the centre of the vortex above (if it was a vortex) was further advanced than its position on the earth.

Meteorological Observations at the Surveyor General's Office, Calcutta.

Thursday, the 19th September, 1839.

Time.	Bar.	Mer.	Air.	Evpg. Sur.	Wind.	Aspect of the Sky.
	Inches.					
Sunrise.	29·600	80.5	80.0	79.8	E.	Generally clear.
At 9h. 50m. ..	·630	85.6	87.9	84.9	E.	Cumuli, or stacked clouds.
Apparent noon.	·616	87.9	90.4	84.9	NE.	Cumuli.
At 2h. 40m. ..	·512	86.4	90.0	85.0	N.	Very cloudy.
At 4 P.M. ..	·480	85.5	88.9	85.0	W.	Cloudy.
Sunset. ..	·478	84.2	85.8	83.3	E.	To the E. Nimbi, or rain clouds.
Rain. ..	....	....	....	....	....	Inches.

N.B.—The rain which fell on the 18th, was noted on the 19th at noon.

20th September, 1839.

Time.	Bar.	Mer.	Air.	Evpg. Sur.	Wind.	Aspect of the Sky.
Sunrise. ..	29·430	79.0	77.0	77.0	NE.	Overcast, rainy, and squally.
At 9h. 50m. ..	·446	80.5	77.9	77.1	N.	Overcast, squally & smart rain.
Apparent noon.	·375	80.0	78.1	77.5	NE.	Drizzly and squally.
At 2h. 40m. ..	·333	80.1	78.0	77.1	N.	Overcast, rain, and squally.
At 4 P.M. ..	·333	79.8	77.6	76.9	NW.	Blowg. a gale with incessant rain
Sutset. ..	·339	79.0	77.0	76.6	NW.	Blowing a gale (but rather moderate,)
Rain.	....	...	....	....	....	Inches 2.62 of the 19ths.

21st September, 1839.

Time.	Bar.	Mer.	Air.	Evpg. Sur.	Wind.	Aspect of the Sky.
Sunrise. ..	29·426	78.5	76.0	76.0	Very High W.	Cloudy.
At 9h. 50m. ..	·491	80.7	81.2	78.5	Ditto	Cloudy.
Apparent noon.	·499	80.7	79.5	77.5	High SW.	Raining.
At 2h. 40m. ..	·490	80.5	79.9	77.0	SW.	Cloudy.
At 4 P.M. ..	·486	80.5	79.5	77.0	SW.	Cloudy.
Sunset. ..	·496	80.0	78.8	76.5	SW.	Cirro strati, or vein clouds.
Rain. ..		....	....	....	....	Inches 4.32 of the 20ths.

We now arrive at the more inland stations, and as the tempest seems to have travelled from the mouths of the Megna, inland, towards Rungpore, I have, to enable the reader better to trace it, begun at Burrisaul, in lat. 22° 35′, long. 90° 22′, near the spot

where the Megna enters the Bay of Bengal, on its Eastern bank, from which place I have a letter from R. Ince, Esq. Superintendent of Salt Chokies.

From R. Ince, Esq. Burrisaul; Lat. 22° 35′ *N. Long.* 90° 22′ *E.*

19*th September*, 1839.—At 4h. 40m. P.M. a gale commenced from the SE.; it blew for half an hour, then ceased for an hour, when it began again, and continued all night. During the 20*th* the wind got more round to the east, and blew with great violence until past midnight, when it settled at south, and gradually cleared up; the wind having veered round to the west on the morning of the 21*st*. The gale was at its *utmost* between 11 and 12 on the night of the 20*th*.

Following now, as nearly as possible, the course of the river on both banks, we have successively the following reports, mostly received from the officers of government at the different stations by Mr. Secretary Prinsep, in pursuance of the public notification inserted in my first memoir.

Report from Mr. Assistant Surgeon E. Foakes, dated Comilla, September 28*th*, 1839.

Latitude 93° 28′ *N. Longitude* 91° 2′ *E.*

On the 19*th* of September 1839, after a very hot day, thermometer standing at 89°, we were visited about half past four P.M. by a heavy squall of wind, attended with torrents of rain, thunder and lightning, but not very severe. At first it came from the north, but shifted round suddenly to the south, and blew very hard for two hours; the wind then abated, but the rain continued all night, and in showers the following day; the wind was from the south, but not very high; it again rose in the evening and blew very hard from SEbS. occasionally shifting round to the east.

21*st*.—6 A.M. The wind still continues to blow from the same quarter in squalls, attended with heavy showers of rain.—Still blowing from the same quarter. 6 P.M. The wind began to lull about this time, and gradually died away, blowing lightly from the southward.

From Dr. G. Lamb of Dacca. Lat. 23° 42′ *N. Long.* 90° 17′ *E.*
Register of the Barometer and Wind at Dacca from 18*th to* 23*rd September,* 1839.

Sept. 1839.	Barom. at 10 A.M.	Barom. at 3 P.M.	Barom. at 10 P.M.	Ther. attached 10 P.M.	Do. outside. at 10 P.M.	Remarks.
18*th.*	29.91	29.82	29.83	85	84	Calm, or a gentle breeze from East and SE. Cloudy in all quarters.
19*th.*	29.84	29.70	29.63	84	82	Forenoon. Calm dense nimbi in the E. and SE. At 7 P.M. a heavy squall from the East for half an hour, followed by rain all night. Gentle breeze from NE. and ENE. Rain measured at 10 P. M. 1.1.
20*th.*	29.56	29.43	29.48	81 5	80	Wind NE. moderate rain; heavy clouds. 1 P. M. Heavy rain; wind gentle from NE. 2 to 4 P.M. Heavy rain, wind in squalls from NE., rain ceased at 5 P.M. Wind increasing from ENE. 6. Hard squalls, no rain; wind ENE. 10 P. M. Wind EbN. with frequent squalls all night. Rain 2.8. 21st 3 A.M. Blowing hard with heavy rain; wind SE. very heavy squalls till 6 A.M. when the rain ceased; and the wind abated slightly.
21*st.*	29.51	29.56	29.64	81	80	7 to 9 A.M. Occasional squalls from SSE. 10 to 12 wind SEbS. fresh with squalls and rain. Noon, wind S. fresh with squalls to 4 P.M. Wind SbW. abating. 6 P.M. Wind SbW. moderate; evening fine. 10 P.M. Wind SE. gentle rain. 2.
22*nd.*	29.73	29.69	29.74	81 5	81 5	22nd Fine weather, wind SE.
23*rd.*	29.78	29.69	29.73	84	83	23rd Ditto, Ditto.

Report by Dr. Sullivan, 36th Regt. N. I.; from Jumalpore. Lat. 24° 58′ N., Long. 82° 58′ E.

On the night of the 20th instant, this station was visited by a severe storm, which continued throughout the night without abatement, and in a diminished rate for the whole of the next day. The wind set in from the eastward at about 5 P.M. from which point it continued to blow, with but slight deviation to the southward, was accompanied by heavy rain, but no thunder or lightning, and came in frequent and tremendous gusts; it gradually reached its utmost violence at about midnight.

For several days previously, the weather was unusually sultry, with a clear sky, and scarcely a breath of air stirring. Thermometer 86° at noon; from which it suddenly fell to 78° on the day of the storm, and has scarcely exceeded that range since.

Jumalpore stands on the western bank of the Burhampooter river; is pretty clear of heavy tree jungle in its vicinity; the nearest hills are distant about 50 miles, in a nearly due north direction; the prevailing wind is easterly, which blows for nine months in the year.

Report from Jumalpore, by Lieut. C. W. Tripp, 30th Regt. N. I.

September 19th. The weather all day hot, the sun bright, evening close and sultry; at 9 P.M. a few clouds raking over the moon; at 10 they had accumulated, and a breeze springing up from the SE. increased and freshened during the night; rain at 11 P.M. and rain continuing on the early part of the morning of the 20th.—Fresh breezes and cloudy weather, with showers at intervals; the wind sometimes lulling into dead calms until 4 P.M., when the wind commenced to blow strong and steadily from NNW. accompanied with rain, and so continued for some hours. During the night it shifted round to SE. and blew a gale with constant rain; wind veering about between two or three points to either side of SE., and coming on with occasional gusts much harder than others. This continued all day of the 21st, with slight variations, though with some occasional appearances of an abatement. Ther. 78° in the

verandah. At 7 P.M. the storm for a short time appeared to be renewing its energies. At 10 P.M. the wind had got round to nearly due west, and was evidently falling. Rain heavier than at any other period. 22nd. At daybreak nearly a calm.

General Observations.—This storm, as felt here, can be considered as only a moderate one, having injured but a few houses that had roofs, and blown down only such trees as had previously been in nearly a falling condition. No thunder nor lightning at any period of the storm.

Memorandum.—The River Dâk from Assam, due on the 22nd arrived this day, the 24th; from which it is to be presumed the storm higher up the Burhampooter river had caused delay to the boats.

Report by Mr. Deputy Collector Smart, Jungypore.
Lat. 24° 28′ *N. Long.* 88° 13′ *E.*

A severe gale occurred at this place, Friday, 20th September, 1839. 6 A.M. Wind easterly, blowing in irregular gusts, weather very cloudy, occasional drizzling. Noon, not blowing so strong, drizzling. 5 P.M. Wind veered to NE. blowing in strong gusts, drizzling. Midnight, blowing very violently from NNE. accompanied with torrents of rain. Continued blowing from the same point, with unabated fury, till 6 A. M. of the 21st.

Saturday, 21st.—6 A.M. Wind veered to north, violence somewhat abated; still raining very heavily. 10 A.M. Blowing furiously again. Noon, wind somewhat abated, but still raining. 4 P.M. Wind veered to NNW. blowing very strong. 7 P.M. Wind somewhat abated. 10 P.M. Blowing from NW. in subdued gusts, still raining. Midnight, wind dying away.

Sunday, 22nd.—6 A.M. A gentle breeze blowing from the south. There was a total absence of thunder and lightning, and this is a feature remarkable in every regular gale.

The following is an extract from a letter dated Moorshedabad, Lat. 24°11′ *N. Long.* 88° 15′ *E., 24th September,* 1839.

"The regiment was detained here for a couple of days, by a very severe storm, which commenced on Thursday night, 19th

Sept. and continued, without intermission, till 9 o'clock, P.M. on Saturday the 21st. It first blew from the SE. then the E.; shortly after from the NE., when there was a lull for about half an hour, the rain falling absolutely in torrents. It then commenced to blow hard from the north, and towards daybreak on Saturday morning, it veered round to the north-west, and continued so all day, with tremendous gusts of wind and rain every now and then. It is said that several lives have been lost in the city and neighbouring villages, by the falling-in of houses, and I fear we shall hear of much mischief on the river, ere long."—*Hurkaru. 29th September.*

STORM.—We hear that during a storm which took place at Rampore Bauleah on the 21st instant, the whole fleet of boats belonging to the establishment of the Superintendent of Police in the Lower Provinces was completely wrecked,—most of them foundering before the occupants could save the most trifling articles. The fleet consisted of pinnaces, budgerows, and beauleahs. The greatest sufferers are Mr. Smith himself, Messrs. Huttimann, Thompson, Potter, and Hodgson, Dr. Rennick, and the Sherishtadar. The whole party were,—after the storm, in which, happily, no lives were lost—received into the circuit house, and treated by the civil officers with characteristic kindness.—*Englishman. 29th September.*

Report from Wm. Bell, Esq. Officiating Joint-Magistrate of Maldah. Lat. 25° 3′. *Long.* 88° 4′.

On Thursday* afternoon, 20th Sept. it rained heavily, and at about $5\frac{1}{2}$ P.M. began blowing hard from the north, ranging between the north and north-west points; it continued, attended with heavy rain, the whole night and the next day, increasing until about 3 P.M. of the 21st, and abating gradually till $10\frac{1}{2}$, when both rain and wind ceased.

I am indebted to Dr. Edlin, for his observations of the thermometer, which fell as low as 79° Faht. having stood steadily for several weeks at 84°, 85°, 86°, and only on one or two

* NOTE.---Friday in the MS. which is evidently an error, since Friday is the 21st, mentioned subsequently.

occasions in the last three months, was marked as high as 89° in the shade.

I am sorry to say, neither of us possess a barometer, so that I am not able to offer any remark upon it. The following day was very close and warm; and a very considerable quantity of rain fell, and great damage was done by the wind.

Dr. Edlin's register of the Thermometer at Maldah.

Sept. 1839.	Before Sunrise	10 A.M.	Noon.	4 P.M.	Evening.	Rain.
18*th.*	82	85	87	90	85¼	
19*th.*	82¼	86	89	92	87	
20*th.*	80	80	80	81	78	1·1
21*st.*	79	80	82½	84	80	2·8
22*nd.*	79	84	85	87	84	2
23*rd.*	80	84	85	87	83¾	

Report from Chilakhal, about 12 *miles NW. of the station of Rungpore. By C. W. Russell, Esq. Civil Service.*

Lat. about 25° 53′, *Long.* 89° 00′.

At daybreak on the 20th instant, the sky became overcast and wild. At 10h. 30m. A.M. a storm commenced from NE. accompanied by rain, and continued, with about the same degree of strength, until 1 A.M. of the 21st, when it lulled; then recommenced from the same quarter (NE.) increasing in violence until 8. A.M., from which time until 10 A.M. it blew exceedingly hard, with violent gusts at intervals; the wind during these two hours continually shifting between N. and NE. It now moderated slightly, until 2 P.M. from which hour until 1h. 30m. on the 22nd (when it suddenly ceased) it raged with the greatest violence; shortly afterwards, the wind went round to SW. and continued in that quarter until 3h. 50m. P.M., when it went back to NE. with every appearance of a recurrence of the storm.

It is difficult to say precisely when the storm was at its greatest height, but I am inclined to think it was between the hours of 8 and 10 A.M. of the 21st, and the last hour of its continuance.

Variations of the Thermometer.

20*th* 8 A.M.	86	Wind NE.	21*st* 1 A.M.	79	NE.
11	81		6	76	
12 Noon.	81		8	75	NE.
2 P.M.	80		10	75	
4	80		12 Noon.	76	
6	80		2 P.M.	76	
8	79		4	76	NE.
10	79		6	76	
12 Midnight.	79		8	76	
			10	76	
			22*nd* 1h. 30m.	77	NE.
			The time the storm ceased.		
			5	75	
			6	76	SW.
			8	75	
			12 Noon.	78	
			4 P.M.	80	
Chilakhal on the South bank of the Teestah, 12 miles NW. of the Civil station of Rungpore.			5	75	NE.
			5	75	

C. W. RUSSELL.

The storm mentioned in the following report, though it is not connected with ours as a gale of wind, may possibly be so in an electrical point of view, for it will be remarked, that while in general the vessels and stations within the influence of the turning gale, experienced but little thunder and lightning, this storm was, on the contrary, almost a perpetual discharge of it; as if the electric fluid had been generated by the vortex, conducted along the Himalayan chain, and discharged at Dadoopoor?

To H. T. PRINSEP, ESQUIRE, *Secretary to Government.*

SIR, *Dadoopoor, September 30th,* 1839.

In compliance with general orders of the 11th current; I have the honor to forward some particulars regarding a storm which occurred here during the night of the 20th, and morning of the 21st instant. The observations were made by the Canal Overseer stationed at this place, Conductor W. Dawe, whose words I quote, and have merely to add my testimony to their correctness.

The Canal station of Dadoopoor is situated below the junction of the Somlie and Puttcallee rivers with the Jumna, on the right bank of the latter; lat. 30° 12′ N. and long. about 77° 23′ 45″ E., about 16 miles from the southern base of the Sub-Himalayas.

Extract from Mr Dawe's Report—

"The evening of the 20th was clear, with a light easterly wind, "the fore part of the night; moon light, without a cloud. About "11h. 30m. P.M. distant lightning was perceptible in the NW. "quarter, and about midnight, thunder was heard in the same "direction. At 1h. 30m. A.M. of the 21st, the storm came on in "sudden gusts, accompanied by a continual roll of thunder "and vivid streams of lightning and rain, driven along with great "force, nearly parallel to the earth. The latter only continued "for about half an hour,* but the storm did not totally subside "till about 3 A.M., when it fell a dead calm, and towards "daylight the sky was quite clear, with light airs from the "eastward. The direction the storm took was from the NW. "to the SE. This storm appears to have been more extensively "felt, than those which generally occur in this neighbourhood. "By reports which I have received, it appears the same ravages "have been extended as far down as Kurnaul, and upwards "from this to the foot of the lower Hills, (as I have personally "observed). There appears to have been no abatement in the "force of the storm, for I witnessed in my route yesterday "(to the Canal head) trees of immense size torn up by the "roots."

I append an extract from the Meteorological Register kept here, from the 18th to the 24th instant, inclusive.

I have directed the attention of the Overseers employed under my orders at Kurnaul, Hansi, and Delhi, and two intermediate stations, to the registry of storms, and on the occurrence of such phenomena I will do myself the honor to forward a combined report of their observations.

I have the honor to be, &c.

W. E. BAKER, *Lieut. Engineers.*
Superintendent Delhi Canal.

* The quantity of rain which fell during this storm was 0.91 inch.

Extract from the Meteorological Register kept at Dadoopoor for September, 1839.

Days of the month.	Observations day-break.					Observations 10 P. M.				Observations at 4 P. M.					Observations at 10 P. M.				
	Barometer.	Attached Ther.	Detached Ther.	Wet Bulb Ther.	Rain Gauge.	Barometer.	Attached Ther.	Detached Ther.	Wet Bulb Ther.	Barometer.	Attached Ther.	Detached Ther.	Wet Bulb Ther.	Rain Guage.	Barometer.	Attached Ther.	Detached Ther.	Wet Bulb Ther.	Rain Guage.
18	28·652	77·0	76·0	76·0	0·0	28·718	87·0	86·0	82·0	28·640	92·0	90·0	84·0	0·0	28·676	79·0	78·0	77·0	0·0
19	28·702	74·0	73·0	73·0	0·0	28·802	72·0	71·0	71·0	28·714	81·50	81·0	77·0	0·67	28·720	74·0	73·0	73·0	0·0
20	28·706	70·50	70·0	69·0	0·0	28·754	78·0	78·0	75·0	28·636	88·0	86·0	80·0	0·0	28·672	79·0	78·0	78·0	0·0
21	28·632	70·0	69·0	68·0	0·91	28·686	82·0	81·0	75·0	28·622	89·0	88·0	81·0	0·0	28·622	76·0	75·0	74·0	0·0
22	28·622	71·0	70·0	70·0	0·0	28·702	83·50	83·0	78·0	28·662	90·0	89.0	81·0	0·0	28·660	77·0	76·0	76·0	0·0
23	28·702	71·0	70·0	71·0	0·0	28·765	83·0	83·0	82·0	28·718	91·0	90·0	81·0	0·0	28·718	77·0	76·0	77·0	0·0
24	28·730	72·0	71·0	72·0	0·0	28·816	84·0	84·0	84·0	28·732	90·0	89·0	79·0	0·0	28·732	79·0	79·0	76·0	0·0

(True Extract)

(Signed) W. E. BAKER, LIEUT.

Superintendent Delhi Canal.

(True Copies) H. T. PRINSEP.

Secretary to the Government of India.

(Signed) W. DAWE, CONDUCTOR,

Delhi Canal Department.

Dadoopoor, 29th September, 1839.

The following tables will show, as nearly as can be collected from the preceding documents, the state of the wind and weather at noon over the whole extent which they embrace, and from it the course of the gale upon the chart has been deduced.

Tabular view of the Gale between 18th and 21st September 1839, at Noon.

Date, Civil time.	Names of Vessels & Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Ther.	Remarks.
			° ′	° ′			
Noon, 18th Sept. 1839.	H. C. Str. Enterprise, ...	SW. Fresh gale veering to the Westward by 19th, ...	13 22	84 50			Gale increasing, and sea rising.
	Bark Isadora,..	NW. moderate, veering to NNE.	17 40	83 28			Cloudy weather at Vizigapatam.
	Brig Spy, ...	Steady breeze, East and cloudy,	18 40	88 48			
	H. C. S. Amherst, ...	Southerly breeze, ...	19 26	93 34	30.3		At anchor in Kyouk Phyoo, Harbour.
	John William Dare, ...	Moderate from SE. clear weather	20 36	90 20	29.50	86	Standing to the SSW. and SW. from Chittagong to Calcutta.
	Emerald Isle, ...	Light winds SW. to East, ...					No Log for this day.
	At Balasore,..	SE. wind. Slight rain, ...	21 28			87	
	Beacon Light Vessel, ...	ESE. squally.....	21 04	88 27			At anchor Outer Station.
	Hope Light Vessel, ...	Southerly. calms hot and sultry,	21 26	88 07	22.70	87	At anchor Inner Station.
	Saugor, P. V., ...	ENE., ...					Eastern Channel and Saugor roads.
	Krishna, P. V., ...	Pleasant Easterly breezes,.. ..					Ditto ditto.
	Megna, P. V.,.....	Variable from ESE. cloudy and rain, ...					At anchor near the Inner Station.
	Jane, P. V.,.....	Very light SEbE. breezes,....					At anchor below Point Jelly.
	At Calcutta, ...	No report for the 18th, wind NE.			29.61	0	Cloudy to the Eastward.
	Burrisaul, ...	No report for the 18th, ..	22 35	90 22			
	Commillah,.....	No report of wind and weather for the 18th.	23 28	91 02		87	Cloudy all round.
	Dacca.....	Calm or gentle breeze from East or South, ...	23 42	90 17	29.86		
	Jungypore, ...	No report, ...	24 28	88 13			
	Jumalpore,.....	No report, ...	24 58	89 58			

Date Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon, 19th Sept. 1839.	H. C. Steamer Enterprise, ..	Heavy gale, SW.	13 18	85 10				High topping sea, squalls and rain.
	Bark Isadora, ...	Moderate NNW. winds and gloomy weather, ...	17 40	83 28				Left Vizigapatam roads.
	Brig Spy, ...	EbN. gale but more moderate than before, ...	20 36	88 01				Threatening to the NE. but moderating at noon.
	H. C. S. Amherst, ...	SE. squally and rain, ...	19 26	93 34				At anchor in Kyouk Phyoo harbour.
	John William Dare, ...	ENE. strong breezes and passing squalls, ...	20 06	88 15	29.39		86	A heavy sea from the SW.
	Emerald Isle, ...	NE. fresh breezes and cloudy, ..						In the Gasper Channel.
	At Balasore, ...	NE. fresh breezes and cloudy, ..					86	
	Kedgeree, ...							
	Beacon, L. V.	Strong, increasing ESE. breezes, cloudy and rain.	21 04	88 27				Heavy swell from the eastwd., thtg. weather.
	Hope, L. V.	Moderate NE. threatening weather, ...	21 26	88 07	29.70		86	Threatening to E. and S.E. heavy swell.
	Saugor, P. V.	Moderate NNE. breeze and fine,						Kedgeree roads.
	Krishna P. V.	Moderate gale from NE., ...						Eastern Channel.
	Megna, P. V.	Light breezes E. to ESE. and squally, ...						At anchor near the F.L.
	Jane, P. V.	Light winds from SSE., ...						Off Point Jelly.
	Cauvery, P. V.	Moderate northerly breezes & cldy.						Kedgeree Roads.
	At Calcutta, ...	Hot sultry calms, NE. airs, ...	22 34	88 22				Threatening to the Eastd.
	Burrisaul, ...		22 35	90 22				Gale commenced at 4 P. M. from SE.
	Commillah, ...	Hot sultry weather, ...	23 28	91 02			89	Heavy squall at half past 4 P. M.
	Dacca, ...	Hot sultry and calms, ...	23 42	90 17	29.77			Threatening to the East, squalls at 7 P.M.
	Jumalpore, ...	Hot clear weather, ...	24 58	89 58				Breeze from SE. 10 P. M.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
20th Sept. 1839.	H. C. Steamer Enterprise,	SWbS. decrsg. gale fine & clear,	13 33	85 35				Gale had terminated by noon.
	Bark Isadora,..	NNW. cloudy weather, ...	17 50	83 35				At Bimilapatam.
	Brig Spy,..	Gale from NW. and threatening,	20 44	88 18				Hove too under close reefed main topsail in 45 fms. wtr.
	H. C. S. Amherst,..	South, rainy and squally, ..	19 26	93 34				Squalls from SE. veering to S. at noon. In Kyouk Phyoo Harbour.
	John William Dare, ...	Heavy gales NNW. with rain,..	20 10	88 10	29.23		85	Hove too under close reefed main topsail.
	Emerald Isle, ...	Blowing strong WNW. to NW.,						At anchor off Kedgeree.
	At Balasore, ...	NW. flying clouds and rain, ..						Strong gusts at times from NW.
	Beacon, Light Vessel,.. ..	Gale about NW. heavy squalls,	21 04	88 27			83	Varying NNW. to WNW.
	Hope, Light Vessel,.. ..	NNW. Strong breezes with hard squalls, ...	21 26	88 07	29.43		80	Confused sea & threat. appearance, increasg. to a gale
	Saugor, P. V.	Hard squalls N. to NW. and rain						At anchor Eastern Channel.
	Krishna, P. V.	NW. blowing moderate gale heavy squalls and rain,.....						At anchor near Floating Light.
	Megna, ...	Hard breezes N. to NNW. with heavy rain at intervals, ..						Ditto ditto ditto.
	Jane, P. V.	NNW. Strong breezes sql. & rain,						At anchor.
	Cauvery, P.V.	Strong northerly breezes and rain,						Between Kedgeree & the F.L.
	At Calcutta, ...	NNE. to NE. Strong sql. & rain,	22 34	88 22				
	Burrisaul, ...	Blowg. with violence (about ENE.)	22 35	90 22				
	Commillah.	Moderate gale about south, ..	23 28	91 02				
	Dacca, ...	NE. moderate and rain.	23 42	90 17				Moderating about noon,
	Jungypore, ...	Easterly in irregular gusts, ..						Midnight NNE. blowing violently and heavy rain.
	Morshedabad, ...							
	Malda, ...	Raining; wind not noticed, ..	25 03	88 04				Gale from about NNW at 5½ PM
	Jumalpore	Fresh gale from E. to SE., ...	24 58	89 58				Reports not very distinct.
	Rungpore Chilakhal, ..	NE. gale with rain, ...	25 46	88 44				Gale began at 10h. 30m. A.M.

Date, Civil time.	Names of Vessels and Places.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
			° ′	° ′				
Noon. 21st Sept. 1839.	H. C. Steamer Enterprise, ..	About WSW. squally at times,	14 27	83 56				
	Bark Isadora, ...	Westerly winds and hazy weather, ...	17 50	83 35				At Bimilapatam.
	Brig Spy.	Fresh breeze (SW.?) cloudy, ..	20 53	88 35				Heavy swell from SW.
	H. C. S. Amherst, ..	South, moderate. Incessant rain,	19 26	93 34				
	John William Dare, ...	Moderate and fine weather, ...						
	Emerald Isle, ..	WSW. clear sky, ...						At anchor, Kedgeree.
	At Balasore, ...	Wind SE. slight rain, ...					84	
	Beacon L. Vessel, ...	Moderate WSW. breeze and fine,	21 04	88 27				4 A.M. gale broke with fresh WSW. breezes.
	Hope Light Vessel, ..	Fresh WNW. breeze and gloomy weather, ...	21 26	88 07	29.51		84	
	Saugor, P. V.	Moderate WSW. and fine, ...						Near the Reef Buoy.
	Krishna, P. V., ...	Moderate Westerly breeze and fine, ...						On the Eastern reef.
	Megna, P. V.	Fresh breezes West to WSW. ..						Ditto ditto ditto.
	Jane, P. V. ..	About West, moderate.						Off Bankshall.
	Cauvery, P. V.	SW. breezes and fine.						Eastern Channel.
	At Calcutta, ..	Squally from West and SW. drizzling rain, ...	22 34	88 22				Gale terminated about noon.
	Burrisaul, ..	About West moderate, ...	22 35	90 22				
	Commillah, ..	S-Easterly rain, thunder and lightning, ...	23 28	91 02				
	Dacca, ..	South, fresh with squalls, ...	23 42	90 17				
	Jungypore, ..	North, rain, ...	24 28	88 13				4 P.M. Wind veering to NNW.
	Malda, ..	About (NNW?) with rain, ...	25 03	88 04				
	Jumalpore, ..	About SE., ...	24 58	89 58			78	10 P.M, had veered to W.
	Rungpore Chilakhal, ..	NNE. violent gusts and blowing hard, ...	25 52	87 00				At 1h. 38m. on 22nd a lull, and wind shifting to SW.

I have only been able to find for this Gale a good centre on the 20th September, when, as will be seen, it was blowing in a tolerably well defined circle, the centre falling close to Chittagong, where, as we learn, several native craft perished, whether on that day or not I am not certain, but suppose it most probable. The centre, if it had one on the 21st, was not far from Chilakhal, but it seems to have been a gale which had not sufficient strength to form itself into a regular vortex for more than one day, and was interrupted by other causes producing the irregularities, which will be seen by any person who will take the trouble to examine the table with the chart.* One of the most probable obstacles may have been the range of the Kasiya hills, which skirt the eastern bank of the Burhampooter.

Some account of a Journey from Kurrachee to Hinglaj, in the Lus territory, descriptive of the intermediate country, and of the port of Soumeanee. By Captain HART, *2nd Grenadiers; (Bombay Army.)*

[Communicated from the Political Department, Government of India.]

Under the impression that any information regarding this part of the country may prove acceptable, I forward the accompanying remarks made during my late excursion to the celebrated temple of Hinglaj, which I am not aware of any European having before visited. A rough sketch of my route is annexed.

Route from Kurrachee to Soumeanee. 50 miles.

On the 24th January I left Kurrachee in company with a party of Hindoo pilgrims, and crossing the Hub river reached Soumeanee in three marches. The route as far as the Hub lies over the high ground between the range of hills in which the hot springs, Pier Munga, are situated and the sea. Owing to a heavy fall of rain a few days previous to my departure, a large body of water was running in the river, but on my return, I found only a small stream, which I

* The Chart will appear with Part II. in the approaching number of the Journal.

was told would continue to flow for a short time, and then water always be found in pools. The bottom is covered with loose pebbles, and its width about 100 yards. I saw no signs of cultivation or inhabitants near it, but a few miles higher up, some Noomreea families with their flocks were located. A belt of tamarisk jungle extends for a few hundred yards on each side of the river; four miles beyond it, the road enters a pass in the Pub mountains, called "Guncloba" by Mahomedans, and the "Ungeekhera Bherum Suk," by Hindoos. It is stony, of trifling ascent, and the descent equally gentle to a tract full of ravines, extending from the Mor range of mountains which branch off from the Pub towards Beila and the sand hills on the sea shore. A few years ago this Suk was occupied by a party of Noomreeas who plundered the pilgrims, and eventually stopped all communication, until the Yam of Beila sent troops and dispersed them. Some Mahomedan tombs not far from it were pointed out has having been raised to those who had fallen in battle. To the left of the road, and a hundred yards distant from it, is the Bhowanee well, only three feet in diameter and nearly forty deep. It is said never to be dry, yet travellers alone use it. The face of the country is here sprinkled with patches of milk bush, and low shrubs, which continue to the Boareed Suk, where the road leaves the high ground for the beach. A few miles before reaching it, the bed of the Bohur river is crossed. It appears merely one of the larger ravines, and the route runs a short distance down its bed to avoid an abrupt ascent on its right bank. The Boareed Suk presents a most singular appearance, and is formed by one hill having been detached by some convulsion of nature from the range, which is here about two hundred feet in perpendicular height. The path leads along the edge of a deep ravine, where the rush of the stream has cut a channel as even as if excavated by art, and then winding round the back of the hill, slopes to the shore. The descent is gentle, and laden camels pass without difficulty. The sea at this spot is not far distant, but further on the shore gradually widens, until it leaves an extensive flat between it and the sand hills, in some parts nearly a mile in breadth, covered

with a low jungle of tamarisk, and wild caper bushes. On my return grass had sprung up over the greater part of this tract, and afforded excellent pasture to a few ponies belonging to the pilgrims with us, but I saw very few cattle or goats feeding there. Three miles from the pass is a nulla, in which brackish water is procured by digging, where travellers usually halt, and one mile beyond it a decayed tree marks the "Kharee well," where sufficient is found to supply small parties. This was the second day's journey. On the third, we continued our course along the flat, which is never at present overflowed by the sea, and passed the "Seeta Koowas," (a number of kucha wells so called,) which have been sunk at different times, many now filled up by the earth falling in, and but little water in the rest. The sand hills here lose their precipitous appearance, and gradually decrease in size until they sink to the level of the plain. The ruins of a small building named "Peer Putta" by Mahomedans, and "Gopeechund Raja" by Hindoos, lie to the left of the road before it reaches the Vindoor river, which is dry except after heavy rain, when it runs for a few hours only. The bottom is sandy, and its width trifling. A barren plain brought us to a range of sand banks, ascending which we found ourselves in sight of the town of Soumcanee, situated at the head of a bay in an amphitheatre of sand hills, and remarkable only from the absence of all verdure around it. The party halted at a ruined Dhurumsalla, a short distance from the wells which supply the inhabitants with not very sweet water. They are but two in number, only a few feet in diameter, and are lined with logs of wood to prevent the sand choking them. I had previously informed the Dewan of the Yam of Beila of my intention of passing through his country; he came out to meet me, stated that he was directed to obey all my orders, and would, if I wished, accompany me on my journey. His attention was most marked, and it was with difficulty that I declined his request to be allowed to supply food to my party at the Yam's expense, although I particularly explained to him that I was merely a traveller, and not authorized to receive presents from his master; but only desired the protection

always afforded to strangers. He said that the Yam wished by his attention to me to shew the consideration that every British officer would meet with while in his territory, and a Noomreea sepoy was ordered to attend me as long as I remained in the country. In the afternoon the people crowded out of the town to look at me, but I experienced no rudeness or incivility whatever from any one.

Soumeanee, Town and Port,

The port of Soumeanee has been long known to Europeans owing to its being on the direct route to Khorasan and Afghanistan. The town is built at the head of a large but shallow bay, in shape not unlike a horse-shoe, into which vessels of heavy burden cannot enter, except at spring tides. The entrance is narrow, and the low sand banks which border the harbour afford little or no protection from the wind. All boats but coasting craft, anchor outside the bar, at a distance of nearly two miles from the town, in the open roadstead, where they are much exposed. Their cargoes are discharged into the smaller dungees and then landed. On inquiring how the horses exported from Khorasan were embarked, I was told that the vessels were brought in at spring tides, and the animals swam off to them. As we halted here a day to lay in a stock of provisions, I had an opportunity of making a few inquiries regarding the state of the district under the Yam's rule, from the Hindoo agents of Kurrachee and other merchants residing there, the result of which I now beg to communicate.

The ancestors of the Yam of Beila are said to be descended from one of the numerous Hindoo Rajas who were converted to the faith on the advent of the followers of the Prophet. At a later period they connected themselves in marriage with the kings of Beeloochistan, better known of late as the "Khans of Kelat," to whom they paid no tribute (although liable to be called on for military service), but on occasions of festivity or visits presented nuzurs as an acknowledgment of their paramount authority. The district over which they rule, extends from the port of Soumeanee northward to Khoydar, and from the Pub mountains beyond the greater range of the Horas. This tract of country is inhabited by the Noomreea tribe who pay allegiance to the Yam:

The only towns comprised within it are Beila, Oothul, Soumeanee, and Lyarce, the former being the usual residence of the chief. Soumeanee is the only port, and the customs on its imports and exports form the principal item of revenue. It is described as having been in former days but a mere village inhabited by fishermen, called as all such places are on this coast, "meanee." Its bay affording more protection to their boats than they could find on the open coast, its population naturally increased, and as trade began to flow through it, the epithet "Sou" was prefixed par excellence. A small mud fort was built on the sea side to check the rapacity of the Gulf pirates, and many Noomreeas from the jungle located themselves there. At present it contains upwards of two hundred houses, Population of Soumeanee built as usual of wattle and mud, and the number of inhabitants is said to amount to a thousand families. Of these the greater proportion are Noomreeas, who earn their subsistence by transporting merchandise to the northward, and fishermen. The Hindoo portion of the population does not exceed three hundred, a few being agents of traders at other ports, and the rest artisans and shopkeepers. The Yam exercises the supreme authority, but as the present incumbent is a child, his power is in the hands of two Dewans, a Mahomedan and a Hindoo. They are however controlled by his mother, who has the reputation of being a woman of sense and discretion. The former regulates the police, and the latter the revenue, the total amount of which is about 45,000 rupees per annum; of this sum from rupees ten to twelve thousand is derived from the cultivation round Beila, Oothul, and Lyaree, where Revenue. soowaree, oil seed (shungruf), &c. is raised, and the gum of the googhul tree found. The customs collected at the port of Soumeanee and the transit duties of Beila and Oothul are farmed by a Kwaja and a Hindoo for rupees 34,000 per annum; a few years ago the sum paid was rupees 30,000, and before that only 26,000—a pretty convincing proof of the increasing prosperity of the port. Two thousand rupees of this amount are said to be derived from the tax on fish. The contractors pay part of the amount of their agreement in advance, and the balance at the end of the year.

Resident traders are only called on to close their accounts at the annual settlement, but other merchants pay at once. The custom duties are less than those exacted at Kurrachee, and much consideration (as I was told by some Afghan merchants I met there with large investments,) is shewn to all traders by the authorities. On each bale of piece goods rupees 10 are levied; on other articles duty is charged at the rate of rupees 32 to merchants, and rupees 38 to ryoths. The principal imports are cloths and metals from Bombay, sent to the northward; and dates from Mukron, and rice from Scinde, for internal consumption; slaves also are brought from Muscat, but seldom unless on private order; on each a tax of rupees 5 is taken. So far have the Hindoos resident here got over some of their prejudices, that the generality of them employ Seedhees as household servants to clean their cooking utensils. The exports consist of wool and googhul from the Beila district, and wheat, ghee, moong, asafœtida, and horses from Khorasan. The former article is brought in large quantities from the hills near Shah Bilawul and beyond Beila; its quality is finer than that shipped at Kurrachee, and the cost here averages from 14 to 16 rupees a maund. The oil plant (Shura or Shungruf) is raised in large quantities, and both its seed and oil are sent to Muscat, Gavaddel, Kurrachee, and the mouths of the Indus: in Soumeanee alone I saw no less than twenty mills at work. The coins in circulation in the towns are German crowns or rials, ————* and Soumeanee pice, those of Kurrachee not being current in the neighbourhood. There are only six vessels of any size belonging to the port, five owned by a Hindoo, and one by a Mahomedan. The fishing and coasting boats are about twenty in number. When walking round the town I examined the remains of the fort. It appears to have been of very small extent. The remains of two bastions and a curtain on the sea side are now alone discernible, and they are almost level with the ground. The bank on which it stands has been partially washed away, but the Dewan explained to me as the cause of its never having been repaired, that since the destruction of the pirates by the British, it was

Duties.

Imports and Exports.

Tonnage of the Port.

The Fort.

* Illegible.

Shops. on longer of use. The number of shops do not exceed fifteen, in which grain and dates are sold. The weavers (of whom there are not many) fabricate a few silks and coarse cotton cloths, Manufactures. which find a sale here; a common kind of carpet called a "furrash" is also made from goat and camel hair. Indigo is imported in small quantities, and is used by the dyers (there are only three) in colouring the clothes of the male portion of the population. There are four mosques, and Mosques and temples. six dhurumsallas and temples in the town and neighbourhood. I was informed by the Afghan merchants that at present the hire of a camel to Kelat was as high as twenty-five rupees, owing to the great demand for them by our troops. Goods to the amount of rupees six hundred, the property of one of them, had a few days before been stolen from the "Peer Kee jugah" outside the town, where they usually halt. On representing his case to the Dewan, he told me the thieves had been traced, and that no exertions should be wanting on his part to restore it, and what the plunderers could not pay in *kind*, they should *in person*. In the customs farmed by the contractors the sum of rupees 2/2 taken from each pilgrim, and some mendicants, who visit the temple at Hinglaj should be noticed. Of this six annas belongs to the Yam, part of the balance is divided by the town authorities, and the remainder goes to the contractors. For it, protection is supposed to be afforded them while in his territory, and as a proof of it, one of the leaders of a party we met, mentioned his having lost a "kottia," or drinking vessel, some years before at the Aghor river, and on his preferring a complaint, that it was searched for, and found in the hut of a Noomreea, who was forced to return it, and had a valuable camel taken from him as a punishment. I met several of the pilgrims who had lost articles of trifling value, and one, who was head of his party, a few marches beyond Soumeanee was robbed of his clothes and grain, but they felt confident if they saw the Dewan on their way back, that he would oblige the contractors to pay their value.

Payments made by Pilgrims visiting Hinglaj.

Fresh camels having been hired in the place of those brought from Kurrachee, which do not thrive on the forage

found here, and are less strong and healthy in appearance than those bred on the hills, we set out at midday on the 28th, and as the direct route was unsafe for the camels, from the ground having been so lately saturated with rain, we wound round the town, and reached the sea beach, along which we marched for some miles, until nearing the creek at the northern extremity of the bay into which the Pooralee river empties itself, we turned north, and keeping close to the edge of the sand hills which border the mangrove swamp called "Gooroo-Cherla-Kar-un" reached a pool of fresh water, where we halted.

Churoo, 9 miles. This spot is named Churoo, and is merely a place of encampment. A few herds of camels were feeding in the cypress jungle, which covers the inlets from the swamp. Their attendants where the only people we saw on the road. A short distance before arriving at our ground, we passed the tomb of "Shaik Ali, or Swamee," built on one of the low sandy ridges which here extend inland as far as the eye can reach, covered with stunted milk bushes and tufts of coarse grass. To its right runs the road to Lyaree. The following morning we crossed the "Thura," a flat which extends for many miles between Lyaree and Shaik Karaj. Brushwood abounds on it, and both cattle and goats find pasture on the grass which grows there; the few I saw however did not appear in good condition. An open plain on our right, sprinkled with cypress bushes, was pointed out as reaching to near Lyaree, but I could not distinguish any signs of cultivation. Continuing a westerly

The Pooralee River. course, we came to the Pooralee river, an insignificant stream with a muddy bottom. It rises in hills north of Beila, and is said always to have water in its bed, but the cultivators of Lyaree raise embankments across it for the purpose of irrigating their fields, so that unless after heavy rain it cannot be called a running stream below that town. Beyond it a gradual rise brought us to another range of sand hills, in the midst of which we encamped near a small well of brackish water. This is generally the first stage from Soumeanee, but the "Truppa" being slippery for camels, where it is usually crossed, we were obliged to make a circuit, which doubled

Dambo, 9 miles. the distance, to Dambo. This likewise is only

a halting place, as were all the stations on the route to Hinglaj, without the sign of a habitation or a human being near them. The few Noomreeas who are scattered over the face of the country keep their flocks at a distance from the road, but whenever they see a cafila, they come with their families to beg for food. It has become an acknowledged custom for all travellers to give it; even the mendicants themselves spare a portion of their coarse bread for the purpose. Money (save a few Soumeanee pice, to pay for milk when it can be had) is almost useless, for nothing is to be purchased on this barren waste. A mile beyond Dambo, before leaving the sand hills, a small grove of cypress trees is passed, noticed as being of greater size than those met with elsewhere. On descending from the ridge, the road crosses the heads of a number of inlets running into an extensive backwater from the sea, which here is not visible, as the sand banks along the shore are rather abrupt. Ascending a gentle rise we come on a plain covered with a small bush called Lavee or Lauoo, on which the camels fed with great avidity. Of the plant there are two kinds, the male called Lauoo, and the female Lavee. They are much the same in appearance, excepting the leaf of the latter is shorter and thicker than the former; potash is produced by burning the male plant, which is taken to Kurrachee and Soumeanee, and sells at from four to five cassess (about 100 pounds) per rupee. This tract is called "Chura," more particularly that portion of it where low cypress bushes flourish, and pools of clear water with a few wells are found. The open plain extends to the foot of the mountains, and inland to a great distance. Twelve miles from Dambo we found the wells at Kattewara, 12 miles. Kattewara, the encamping ground, choked, nor did we discover water until reaching the base of the lesser range of the Haras, when the pool of a cataract about half a The Hara mountains. mile up a rugged ravine was pointed out to us by a Beroon we casually met on his way to Soumeanee to dispose of camels. This range of mountains, although their height is comparatively trifling, present a most singularly wild appearance, from their rising at once from the plain at an angle of about forty-five degrees on their eastern side, with a still

greater slope to the westward, and being totally bare of all verdure. They are composed of sandstone, and their summits are broken into rugged peaks of the most fantastic shapes. They appear to rise in regular layers, their height gradually increasing as they recede from the plain. Our route the next morning lay along their base, and after passing the beds of many dry nullas we came to a pass near their south-eastern extremity, where they sink into the plain about four miles from the sea. This lake is termed "Gooroo Bherund," and is formed by a large ravine, the course of which we followed for a short distance, and then turning to the left reached the top of the heights, and came in sight of the greater range of the Haras, running almost at right angles to the lesser.

The Phor river, 11 miles. Between the two ranges the Phor river flows through a plain similar to that we had passed. Its banks are fringed as usual with a belt of tamarisk jungle. Before reaching it a number of Mahomedan tombs are remarked, and near them, under a clump of trees, some Noomreeas were engaged in raising a crop of jowaree, the first attempt at cultivation I had seen since leaving Kurrachee. Water is occasionally found in pools in the river, and higher up it can always be procured by digging. Six miles beyond it we came to the Tilookpooree wells, at present covered with an extensive marsh of fresh water, formed by the late rain.

The Chunder koops, 6 miles. One koss from them, in a westerly direction, three hills of extremely light colored earth rise abruptly from the plain. That in the centre is about four hundred feet in height, of a conical form, with the apex flattened and discolored; its southern and western faces rather precipitous, but with a more gradual slope on the others. It is connected with a smaller one of the same form, but of not more than half its size, by a sort of causeway, some fifty paces in length. The third bears the appearance of the cone having been depressed and broken, and covers a greater extent of ground than the others. All three towards their bases are indented by numerous cavities which reach far into their interior; their sides are streaked with channels as if from water having flowed down them. On ascending to the summit of the highest one, I observed a basin of liquid mud, about one hundred paces in circumference, occu-

pying its entire crest. Near the southern edge, at intervals of a quarter of a minute, a few small bubbles appeared on the surface; that part of the mass was then gently heaved up, and a jet of liquid mud, about a foot in diameter, rose to that height, accompanied by a slight bubbling noise. Another heave followed, and three jets rose, but the third time only two. They were not of magnitude sufficient to disturb the whole surface, the mud of which at a distance from the irruption was of a thicker consistency than where it took place. The pathway round the edge was slippery and unsafe, from its being quite saturated with moisture, which gives the top a dark colored appearance; on the southern side, a channel, a few feet in breadth, was quite wet from the eruption having recently flowed down it. I was told, that every *Monday* the jets rose with greater rapidity than at other times, and then only did any of the mass ooze out of the basin. The entire coating of the hill appears to be composed of this mud baked by the sun to hardness. No stones are to be found on it, but near the base I picked up a few pieces of quartz. Crossing the ridge which connects this hill with the least of the three, I climbed up its rather steep side. In height or compass it is not half the magnitude of its neighbour, and its basin, which is full of the same liquid mud cannot be more than five and twenty paces in diameter; the edge is so narrow and broken that I did not attempt to walk round it. One jet only rose on its surface, but not more than an inch in height or breadth; but a very small portion of the mass was disturbed by its action, and although the plain below bore evident marks of having been once deluged to a short distance with its stream, no eruption had apparently taken place for some years. At times the surface of this pool sinks almost to the level of the plain, at others it rises so as to overflow its basin; but generally it remains in the quiescent state in which I saw it; two years previous it was many feet below the edge of the crest. On my way to the third hill I passed over a flat of a few hundred yards which divides it from the other two. The sides are much more furrowed with fissures than theirs are, although their depth is less; and its crest is more extended and irregular. The

ascent is very gentle, and its height about two hundred feet. On reaching the summit, a large circular cavity, some fifty yards in diameter, is seen, in which are two distinct pools of unequal size, divided by a mound of earth, one containing the liquid mud and the other clear water. The surface of the former was slightly agitated by about a dozen small jets, which bubbled up at intervals, but in the latter, one only was occasionally discernible. A space of a few yards extended on three sides from the outer crust to the edge of the cavity, which was about fifty feet above the level of the pools; their sides are scarped and uneven. On descending the northern face, I remarked a small stream of clear water flowing from one of the fissures into the plain, which had evidently only been running a few hours; the mud and water of all the pools are salt. A fourth hill, situated close to the great range of Haras, and distant from the rest upwards of six miles, was pointed out as having a similar cavity to this one. Its color is the same, and although the surface is more rounded, its summit appears broken; I regretted not having an opportunity of visiting it. The name given to these singular productions of nature is the "Koops, or basin of Raj Ram Chunder," by which appellation they are known to all the tribes. They are said to be altogether eighteen in number, seven in this neighbourhood, and eleven between Kedje and Ginaddel in Mukran. Four were pointed out to me, and I was told the other three were hid among the mountains. Some persons with my party had seen one of those in Mukran, and had heard from the Beerooees who shewed them the road to it, that many others were spread over the country; he described it as throwing up jets similar to the large hill here. By the Hindoos they are looked upon as the habitation of a deity, but the Mahomedans state that they are affected by the tide (the sea is not more than a mile distant from the large one,) but this I had reason to doubt, as of the many persons I questioned who had visited them at all times, not one remembered to have seen the pools quiescent, although several had been on the large hill when the mud was trickling over the side of the basin. To endeavour to ascertain this fact I placed several dry clods of earth in the bed of the channel

on a Saturday, as I expected to return by the same route the following week. A range of low hills of irregular form lie to the westward of, and almost close to, the Chunder Koops. I had not time to examine them, but from their appearance I judged they contained sulphur, and on questioning some of those with me, and who crossed them, they said the taste of the earth was like that near the hot springs at Sehwan, where it is known to abound. A Noomreea who was present, mentioned that about six koss off there was another hill called by the name of the "sulphur mountain."

Leaving the Koops on our left, we continued our route towards the greater Haras, increasing our distance from the sea as we advanced. An isolated cluster of hills on the shore, called the "Sath Durwauza," and a rock near them, were pointed out as spots much reverenced by the Hindoos; a range of sand hills soon hid them from our sight, and we crossed the beds of many nullas, the banks of which were thickly lined with tamarisk and baubul trees. This tract is called the "Chota Singhul," and a well in one of its water courses is generally the halting place for pilgrims. We found it dry, and pushed on three miles further to the "Burra Singhul," where in a nulla, at no great distance from the mountains, we came to another well with sufficient water in it for us all. A Beerooee musician with his family here joined us for the sake of the food he was certain of obtaining as long as he remained in our company. A camel and pony, the one led by his son, carrying his wife and two children with their baggage, and the latter ridden by himself with his sitar, was all they possessed. He told me he had left his village in Mukran to visit Beila, in the hope of collecting grain by his skill in music, but not meeting any one who appreciated his merits, he was now on his way home. He earned a precarious subsistence by travelling to the camps of the different chiefs, and reciting the wars of the Yokeeas and Beloochees; they sometimes rewarded him with gifts of food and clothes, &c. The animals he now had, had been thus presented to him. He remained with with us some days, and on his leaving he begged the money I gave him might be exchanged for tobacco or grain. From the

Bura and Chota Singhul, 8 and 11 miles.

Singhul the road runs nearly parallel to the mountains, which here present the same features as the lesser Haras, decreasing like them in height as they near the sea, but an acclivitous and bold range towering far above them was pointed out as that in which the far famed temple of Hinglaj was situated. We passed this day the first encampment of Beerooees I had seen; about twenty families were pitched on the banks of a ravine, where wood and water were found in sufficient quantities to supply their wants, A cloth of camel or goat hair stretched over a pole formed their dwelling, and for their food, the milk of their flocks, prepared in various ways, and a very small quantity of the coarsest grain sufficed. The men wore drawers, with a loose cloth thrown over the shoulders; the dress of the women was merely a long garment reaching from the neck to the ancles. We now skirted the base of the mountains, and passing between them and a low broken range running at right angles, came in sight of the pass leading to the Aghor river; an easy ascent of a few hundred yards, over sandy rock, led to the summit, and a gentle slope of half a mile brought us to the bank of the stream. The view as we turned up its course was magnificent. The river here flows through a break in the mountains, about two hundred yards in width. The faces of the rocks towards the stream are broken and craggy. That on the left bank is higher and more scarped than its opposite neighbour. Beyond them in the distance is seen a range of light colored sand hills, to all appearance nothing but a mass of conical-shaped peaks, and towering far above them are the blue mountains of Hinglaj, precipitous and wild. We encamped above the tamarisk jungle on the high ground between the river's bed and the hills. The width of the stream at this spot is about sixty yards, its bed muddy, and sprinkled with low bushes. The water is not considered very wholesome, as a great quantity of sand is mixed up with it. It reaches the sea about six miles from the hills, and I saw from an eminence many fishing boats from Kurrachee, Soumeanee, and Oormura, anchored at its mouth. A short distance below the pass, on the left bank of the stream, are the remains of an ancient village, the name of which has been long since

The Aghor or Hingool river, 8 miles.

forgotten. The site of the houses can hardly be traced, but I found many pieces of glazed pottery and glass among their ruins. A number of Mahomedan tombs are scattered over the high ground in the vicinity, and in the bed of the river is a bluff rock on which are the ruins of a small fort called Rana-Ka-Kot. Rana-Ka-Kot. It is said to have been built when the Hindoos held the sovereignty of the country, to protect the pilgrims going to Hinglaj from the pirates, who used to run up the river in small boats to plunder them. It covers the whole face of the rock, and consists of two towers joined by an embankment, with a well in the centre; the foundation now alone remains. After heavy rain, it is said that pieces of silver are occasionally found in the site of the village, but I was not able to obtain any; and imagine that although some may once have been seen there, yet were it supposed that the most minute search would be rewarded by even a copper coin, the abject poverty of the people would induce them to dig up the whole surface in searching for it. The hills here are composed of sandstone, layers of shells, and conglomerate.

I made many inquiries regarding the numerous Maho- Mahomedan Tombs. medan tombs which are scattered over the face of the country, near many of which not the slightest trace of a habitation remains; and the situation of some are so far from streams or wells, that the cause of their having been built in such barren spots cannot now be accounted for.

I imagine that when the Mahomedans had established themselves in Scinde, their detachments were stationed in all parts to keep the inhabitants in check, and the spirit of conversion being then all powerful, they buried their dead with much ceremony, and erected stone tombs over them to impress the idolaters with a high sense of the excellence of that faith, which decreed such honours to the departed. On the decline of the Mogul empire, when the troops were required for the defence of the interior, these detachments were withdrawn, the mud huts of the camps soon fell to decay, the population which had been drawn together from the jungle, and derived a subsistence by raising grain to supply them, again spread over the country, and resumed their pastoral habits, when the demand for the produce of their

cultivation ceased ; the embankments raised for irrigation were swept away on the flooding of the streams, the log lined wells soon fell in, and these monuments of stone alone remained to mark where the camps had existed. The very name of the stations, most probably that of the first chief who pitched his standard on the spot, was soon forgotten by the wandering tribes who fed their flocks in the vicinity, when the memorials of his stay had crumbled into dust.

The Aghor river is the boundary between the territory of the Yam of Beila and that of the Khan of Kelat, the chief of the Beerooees. They and the Noomreeas do not intermarry, and although at present at peace with each other, have no hesitation in robbing and plundering whenever opportunity offers. The Beerooees are usually the aggressors, being better armed, and their places of residence in the mountainous countries of Mukran and Beeloochistan little known. The very day I reached the Aghor a party of them, under a person named Dadruheem Khan, on their way to Beila, took from the hut of two Noomreeas every article they could lay hands on, and levied a contribution of grain from some Hindoo pilgrims encamped there. They likewise stopped some of the people with whom I was travelling, who were in advance of the baggage; but on learning that a British officer accompanied them, they instantly let them go. At the Beerooee encampment also they demanded some sheep as a present, but a Noomreea I had left there to purchase milk, threatened them with my anger if they dared to seize even one. Such is the effect which has been produced on the minds of these lawless men by the gallant capture of Kelat, that they proceeded on their way without enforcing their demand. They were more numerous, and better appointed than the armed men with my party, and had they chosen, might have robbed us without much difficulty, but the very name of a European appeared to frighten them. A few months ago I should have been treated with every contumely, but now all were anxious to pay me attention. I felt convinced that the only danger attending my excursion was what I might incur from the vengeance of individuals who had lost relations or friends at the storm of the fort, but even their irritated

fcelings will be allaycd by time. In a country so divided into petty tribes as Beeloochistan, where the authority of the chief, although acknowledged, is but little heeded, and where no man's life or property is safe, further than he can himself protect it, for a traveller to straggle from his party is of course unsafe, as the wretched state of poverty and starvation in which the greater portion of the population exist would induce them to make a dash at him for the sake of his clothes. I was warned of this at Soumeanee, and could never leave our camp without one of the attendants following me at a distance to watch over my security. While halted at the river, upwards of sixty Beerooee and Noomreea families collected round us to be fed; they came from all parts, and I had therefore an opportunity of inquiring about their mode of life. The milk of their camels, goats, and ewes, the dried berry called beera, wild herbs, and a very small quantity of the coarsest jowaree are what they subsist on; meat they seldom touch, as all the male animals are disposed of for clothes or grain, and the females kept for their produce. Dates are considered a luxury, so much so, that when at Soumeanee, I was told of a Noomreea having asked a banian in whose shop he saw a pile of bags of them, whether he took any rest at night. On the Hindoo replying, of course he did; the Noomreea expressed his surprise, and said, were he there, he should be eating the dates day and night. Whenever I offered money, food was always requested in lieu of it. The complexions of the females are more fair than could have been expected from their exposed mode of life, and the number of children with them was, as is usual among a poor population, very great. The Beerooees all wear the low conical cap, which affords even less protection to the head than that of Scinde. All were armed, mostly with a matchlock and long knife: some had swords. Neither they nor the Noomreeas pay any regular tribute, but on occasions of festivity, the chiefs raise contributions in kind from the heads of families. All are liable to be called on for military service, during which time they receive food and trifling pay. In the Yam's territory, whenever cultivation is carried on, "one third" of the produce goes to the chief, and the remainder is left to

the peasant. The vicinity of roads is generally avoided, to escape molestation from travellers, and their camps are moved from place to place as water or pasturage fail them. The nearest village to Hinglaj is Oormura, situated on the coast, at a distance of two days march, and said to contain two hundred inhabitants, many of whom are fishermen. A few Hindoo shop-keepers reside there. The coins current are the German crown, the Mahmoodee rupee, and the paolee. It is described as having a good bay, but my time did not admit of visiting it.

The Aghor river, 8 miles.

On ascending the left bank of the river, after passing between the peaks in the mountains, which seem as if they had been severed by some convulsion of nature, a full view is obtained of the sand hills. They appear to consist of one irregular range, cut in two by the river extending southwards to near the sea, and to the north, far into the mountains. They are from three to four hundred feet in height, covered from base to summit with numberless small conical-shaped, ribbed peaks, like that of the Chundur Koops, and their surface appears to have been baked to hardness by the sun. Towards the plain a few are coated with a crust of dark brown colored sandstone, with which at one time the whole range seems to have been covered. A winding path, with several ascents and descents, steep, though short, leads through them. I picked up many pieces of talc, (or Govid nusree and Cherotee as it was called by my companions) in the water courses near them. On the north-eastern side is a plain of a mile in length and half that width, much cut up by ravines. Through this the river flows over a bed of pebbles, its banks fringed with tamarisk and baubul trees; on its right bank rises the Hingool mountain, conspicuous in the range by its great height and scarped sides. The name given to the stream above the peak in the Hara mountains is the Hingool, and from them to the sea it is called the Aghor. It is always a running stream, is said to have a very long course, and rises on the melting of the snow to the northward, or as it was described to me, without rain falling. After crossing its bed, where the water was about knee deep, the path enters a deep ravine, which leads to a

Assar Poora, 7 miles. narrow valley, and after winding among the hills for about two miles, reaches a running stream, almost hid by low tamarisk bushes, on the banks of which is the usual halting place. Half a mile from the valley, in a narrow Hinglaj, ½ mile. gorge, the mountains on each side of which rise perpendicularly to nearly a thousand feet, is situated the temple of Hinglaj. It is a low mud edifice, built at one end of a natural cave of small dimensions, and only contains a tomb-shaped stone, which is called the goddess Mata, or Mahamayee. At the head of the gorge, a steep and difficult ascent up the course of a water-fall leads to the top of the mountains, and after winding over their summits for some five or six miles, the pathway descends by another water course to the valley, where we encamped. An account of the different holy places visited, and the ceremonies performed on the journey, are fully detailed in my description of the pilgrimage to Hinglaj.

Soon after reaching our encampment, another party of armed Beerooees arrived on their way to Beila, to learn the state of affairs. They requested me to give them tobacco and medicine, said they lived from hand to mouth, and now that their chief was killed (he had fallen at Kelat) were worse off than before. Kelat, the capital, had been always looked on in this part of the world as a maiden city, until the descendant of a line of kings fell, as became him, on his throne, before the all-conquering arm of the British soldiery.

This party was under Chota Beerooee, and was, I imagine, only on the look out for plunder, as a day or two after our return to the banks of the Aghor river they again passed us on their way back, without stopping as usual for food; and that same evening one of our camels was missing, stolen no doubt by them. This was the limit of my excursion. The time fixed for rejoining my regiment having nearly expired, I was not able to extend my journey, as I now felt anxious to do, by proceeding along the coast as far as Gwaddel, and then turning north through Kedge Pungoor and Noskky, visiting Kelat, and returning to Kurrachee viâ Khozdar and Beila.

On our way back, nine days after first seeing them, I again visited the Chunder Koops. The appearance of the

one which was fallen in, was as sand in a muddy pool, but that of water, instead of being clear as before was quite discolored; the stream also had ceased flowing for some time, as the plain bore no marks of moisture. On reaching the summit of the larger one, it was very evident that an eruption had taken place the day before (Monday), for the channel on the western side was quite filled with slime, which had oozed down the side of the hill, and ran some thirty yards into the plain below. The dry clods I had placed when before here, were covered, and it was not safe to cross where the mud had found an issue; whereas my whole party had, when with me, walked round the edge of the basin. The jets rose as usual. So tenacious is the mud of this one, that even cocoanuts which the Hindoos throw on it do not sink, but in the others it is more liquid. No alteration had taken place in the appearance of the small Koop.

We now followed our former route, halting at the Phor river near a muddy pool, and at a brackish well in the Chunra. Our next stage was over the plain beyond Dambo, and across the Pooralee river (now quite dry), to a tank near Shaik Boolun's tomb. After passing it we crossed some low sandy ridges, and wound under a range of sand hills, on which is a well, close to a few tamarisk trees. We then came to a salt flat called the Truppa, extending from the Gooroo-Chela-Karun to the Thura, from which it is distinguished by being totally bare of all shrubs. The tide does not affect it, but rain brings out a crust of salt. We rejoined our former route at the groves of the Gooroo and Chela, and then entering the sand hills which encompass Soumeanee, descended to an oblong amphitheatre surrounded by them, of about half a mile in width and four in length, covered with the lavoo bush, and dotted here and there with pools of brackish water. This tract is called the "Dotur Puk," and it was to avoid it that we kept to the beach road when on our way to Dambo. I had been told that the Yam and his Dewan intended visiting me on my return and offering some presents, but I fortunately reached Soumeanee when they were at Lyaree, and after addressing letters to them both expressing my thanks for the attention

which had been paid me, and the safety with which I had traversed the country, I rode in at once to Kurrachee. Most polite answers have since reached me, regretting that my unexpected departure prevented their having the pleasure of seeing me.

In the hills between Lyaree and Beila "copper" is found in large quantities. A Hindoo now in Kurrachee loaded twenty camels with ore, on his return from Hinglaj, and obtained as many maunds of good metal from it. The whole country is indeed rich in mineral productions, and well worthy the attention of an experienced geologist.

1*st March*, 1840.

Note.---The singular and remote place of pilgrimage, visited by Capt. Hart, as described in the above interesting paper, is one of the fifty-one *Pitas*, or places celebrated as the spots on which the dissevered limbs of *Sati* or *Doorga* were scattered. An intelligent native friend (Raee Seetanath Bhose Bahadoor) informs me that the word *Hinglaj* is not met with in any Sanscrit Dictionary of good authority, and it would appear to be a corruption of the word *Hingulà*, the name of the spot on which the crown of the head *(Bramarandra)* of *Doorga* was cast. My informant has not been able to find any mention of the geographical position of the place so named in the works to which he has referred, but there can be little doubt as to the identity of the spot. He has furnished me with a table of the various *Pitas*, with the names under which *Doorga* and *Shiva* are worshipped at each; one of these spots being *Kalipita*, or Kali Ghat near Calcutta. The *Churamuni Tantra* is, I am told, the authority to be consulted on the subject of this particular fable.

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Fourth Report on the Tenasserim Provinces considered as a resort for Europeans.—By JOHN WILLIAM HELFER, M.D.

England has nearly acquired that full amount of improvement and civilization which its situation, as respects foreign countries in Europe, which its climate, its soil, will ever allow it to acquire.

Scotland and Ireland are still capable of great improvement; however, in the former climate renders success precarious; in the other, moral reasons obstruct amelioration.

England would scarcely advance, when confined to England; nay, it would be obliged to retrograde. That which renders England powerful, and continues to increase its riches and prosperity, is its universal commerce, and its transatlantic colonization.

England, of all countries, knew at all times the best to appreciate the value of colonies. All its colonies advance rapidly, and new ones continue to be established. The East Indies, finally, have also been opened to the mass of the British nation, and these immense territories afford a field of such importance, that its vast consequences cannot yet be appreciated at the present day. * * *.

Adventurers are always attracted by the hopes of sudden gain, and the fables of India's immense riches, are yet vivid in the imagination of the multitude. As the Spaniards flocking to America in search of the Eldorado, when disappointed turned agriculturists; so when the East Indian adventurers find out the errors of their hopes and fancies, they will become sober colonists; for prospects there are certainly open to them, not to become suddenly rich, but gradually wealthy.

It has frequently been stated that Europeans are not fit to become tropical colonists. If this were the case, no colony would have been established in the West Indies, much less would any have become flourishing. Certainly they are not able to bear the climate as day labourers, at least not the greater part, however they can become landed proprietors, superintending their farms, and carrying on cultivation by the labour of other people.

There is much difference between tropical colonies and colonies in the temperate zone; both sets have their particular advantages, and disadvantages. Tropical colonies can only be established by men who are wealthy, or who possess moderate capital to begin with. They employ either the natives of the country in which they settle, or they import foreign labourers. * * *

As the stream of European enterprise will turn towards India, it is necessary to direct it into the most safe channel, and the following paragraphs are written for the purpose of pointing out the different very great advantages which the provinces of Tenasserim possess, containing all that is requisite to transform them into an European tropical colony able to prosper in an eminent degree.

In every colony the new comer finds the country either a waste or occupied; and if occupied, it is occupied either by temporary tenants, or a fixed population.

Temporary tenants do not make use of the ground permanently; they are tribes of hunstmen, or graziers, or people who resort to certain places for the sake of a particular spontaneous production fit for their own use, or for exchange.

A fixed population makes use of the ground as the source of their livelihood.

The Tenasserim Provinces contain all these divisions combined. A great, and the greatest portion is a waste; part of it is used on account of its teak forests, or sapan-wood jungles, or wood-oil trees; other parts are resorted to exclusively on account of a productive fishery; others, on account of the rocks producing edible birds' nests; the smallest part of it is occupied by permanent dwellers, engaged in cultivating the ground.

I. The first great advantage which the Tenasserim Provinces offers, *is the abundance of lands of every description.*

An obstacle which has been found in most of such uncivilized countries is, that the inhabitants come very soon into collision with the new comers.

This can happen only in countries like America, where the population subsisted upon the produce of the chase.

In Tenasserim this would not be the case, for no part

of the population is employed exclusively with hunting, except a few Siamese, who pursue the elephant and rhinoceros, for the sake of the tusk, and rhinoceros' horns. The new comers therefore could only come in collision with the permanent dweller, that is, the planter.

Four-fifths of the native planters confine themselves to the production of rice, which is their chief alimentary subsistence.

The new comer would scarcely begin with this mode of cultivation, but would turn his attention to other articles which are more valuable, and procure his rice from the natives.

The existence of this population of husbandmen is an advantage to emigrants, because they furnish them with food; and it is an advantage to the natives, who find an increased consumption in the emigrant. Another obstacle occurring in countries already occupied, is the spirit of envy and enmity with which the native population is inspired towards the new comers. This spirit of enmity is to be derived either from the principle of self-preservation, or it is founded on religious prejudice, and national aversion.

If we judge from experience and inference, nothing is to be apprehended from the natives of these provinces in this respect.

The Chinese wherever they settled in the provinces, though they over-reached the Burmese in every respect, in a short time were always welcomed and encouraged by them.

They have no more dislike or aversion to European settlers than to the Chinese. Their religion is eminently tolerant; and as for national prejudices, they are far from disliking the Europeans, whom they consider rather to be a variety of the human species of a higher order.

II. The first aim of a colony is to give sustenance to an increasing number of people; as culture and produce increase, a surplus is gained, and the next step will be the endeavour to exchange the surplus for other commodities.

The Tenasserim Provinces are eminently well situated for commerce; their extent of sea-coast amounts to 600 miles; the formation of the country is that of a narrow strip of inland, from which descend numerous navigable rivers, keeping it connected

with the sea coast, and presenting *the greatest facilities for communication.*

III. The next advantage which these countries possess over all parts of India Proper—an advantage of the greatest importance to European settlers—is *the great salubrity of the climate,* which is so remarkable, that the provinces are considered by persons who have had opportunities of comparing the different climates of America, to belong to the most healthy for the European constitution of all known tropical countries. To be convinced of this truth, it is only necessary to compare the bills of mortality kept by the medical gentlemen of the European British corps, stationed at Maulmain and its dependencies, which prove that the rate of mortality scarcely ever exceeds, and is sometimes less than it would be under similar circumstances in Europe.

To account satisfactorily for this phenomenon is very difficult, when we see the countries almost bordering upon the provinces are counted amongst the most fatal of India; Arracan in particular, where the general appearance and form of the country, as well as the nature of its productions, are said to be similar to Tenasserim.

No other reason can be found, than that the country is either part of a narrow peninsula, or immediately adjacent; and that the extensive seas on both sides produce a constant, though not always perceptible current of air, and consequent ventilation, by which the rising obnoxious vapours of fermenting vegetable matter, and other elements of malaria, are either destroyed or carried away.

It is certain that the Arracan fevers are scarcely known; that liver complaints are of rarer occurrence; and pneumonic diseases scarcely known. It may be even asserted that Europeans of temperate habits, chiefly those not addicted to strong liquors, enjoy a greater health than natives; especially native children suffering from the small pox, which occurs epidemically at intervals, and carries away at times considerable numbers, much more, because all the endeavours of medical gentlemen to introduce vaccination have hitherto proved fruitless, some isolated cases excepted.

Preservation of health, besides, does not require here those particular precautions so necessary in India.

Bad effects from exposure are of very rare occurrence, as sporting gentlemen have ample leisure to experience, and this would certainly be of immense advantage to a planter, whose chief occupations are in the fields.

The coolness of the nights almost throughout the year, much contributes to restore vigour and health to a constitution which by constant perspiration during the heat of the day in the dry season, is partially exhausted.

The dangers from wild animals, snakes, and other venomous reptiles, are generally much exaggerated in Europe, if not altogether fabulous. In Tenasserim very little is to be apprehended from these animals.

There are tigers, and pretty numerous too, in the country, but they are of quite a different nature from those in Bengal, and probably more afraid of men than men of them. Accidents very seldom happen to natives, who penetrate daily into untrodden jungles, sometimes quite alone. No other quadruped else is to be feared; a planter may reside his whole life-time in the country without even having an opportunity of seeing a wild elephant or a rhinoceros. Dangerous snakes are very rarely met with, and I dare say less fatal accidents happen here than in the south of Europe.

IV. *The fertility* of a country is of a double nature—essential and accidental. The essential fertility is dependent upon the nature of the soil; the accidental, on the quantity of fertilizing matter found upon the surface, constituting a mould of humus. To determine properly the fertility of the Tenasserim provinces, we must retrace our steps to geological principles, and examine the different formations. A great portion of the surface in the interior is composed of primitive rocks, chiefly granite; great parts of the mountains, running parallel from north to south through the peninsula are granite or gneiss. The ridges are divided by valleys of an inconsiderable depth. The mountains themselves are scarcely ever very abruptly precipitous, generally rounded near the tops, without being lacerated. Almost every where, at least to some inches in depth, the sur-

face is decomposed, and throughout covered with lofty vegetation; a bare rock is one of the greatest rarities on the main land. The felspar decomposes exceedingly quick in tropical humid countries, and is found, contrary to the theory of celebrated chemists, one of the most fertilizing substances within the tropics; the reason is probably that the caustic of potassa or soda, which forms part of the elements of felspar, is neutralized by the abundance of humic acid produced by the immense quantity of decaying vegetable matter.

Hence we see that the valleys between the granitic ridges of the country into which all the decomposed particles are uninterruptedly swept from the sides of the mountains, together with the numerous decayed vegetable substances, belong to the richest soils of this country. Just this part of the country, chiefly inland, is uninhabited, or only employed by isolated Kareans. Not an inconsiderable portion of the surface of the provinces belong to the transition formations. They are much more abundant in the northern and middle, than in the southern parts. These are to be divided into the schistous and calcareous surfaces.

A great part of the country to the south of Maulmain and to the south of Ye, towards Tavoy, present argillaceous transition schist. This is that part of the country which is the most sterile of all; a more stunted vegetation is immediately observed, and great part of this tract instead of presenting lofty forests, is covered with bamboo. The chief reason of this sterility may be accounted for, by the deficient and but slow decomposition of the schists, and by the absence of sandy particles, and by the great absorption of water and moisture.

The province of Amherst possesses remarkable isolated rocks, or ridges of some extent, composed of mountain limestone.

The plains at the base of these abrupt mountains are remarkably fertile.

The mountains themselves, however, rising sometimes perpendicularly, full of chasms, without any level ground, will be found in every respect unavailable for cultivation.

Secondary formations, and amongst those the secondary sandstones (Gres bigarre) with puddingstones, cover the surface.

They are mostly to be found in the southern parts of province Amherst and in Ye province.

These tracts of land will be found but indifferently fertile, and the reason is their aridity, the water being absorbed with avidity by the porous puddingstones; meanwhile the argillaceous parts which enter into the composition form a hard crust, impenetrable to water. Though numerous, these districts never cover a great surface!

Part of the plains of the provinces belong to the tertiary formation; such are the higher parts of Amherst and Ye province, the plains of Tavoy and Kallee-oung, the plains betwcen Tavoy and Polon, such the valley of Taun-biauk and the elevated land of Meta-mio, such the plain country on the Tenasserim river above the site of the old town, which is an argillaceous marly deposit of great extent. All these enumerated places are fertile, scarcely any are exclusively sandy, none, as much as I am aware of, gypsous.

To the postdiluvian formations belong the deltas of the rivers, which are, when above the influence of the salt water, highly fertile; if however so low as to be exposed to the influence of the salt water, entirely unproductive. To the first belong the low lands on the confluence of the Salween, the Gain, and the Attaran rivers, the small delta of the Ye river, and others of minor note between Tavoy and Mergui; to the latter belong all the mangrove districts, which are entirely unfit for cultivation. The great source of fertility in the country, independent of the fertilizing elements of the ground, is the quantity of the humus, or decayed vegetable matter, which has accumulated through tens of centuries. It is only necessary to represent that the whole country is an uninterrupted forest, the greatest part never cut. This constitutes the productiveness of virgin soils. We can safely pronounce that the greater part of the 30,000 square miles of which the provinces are composed, are fertile, or fit to be made fertile; and that only the higher parts of the mountains and the mangrove territories are sterile; the quantity of unproductive sterile, or unavailable lands, is scarcely one-fourth of the area.

Which part of the province may be the most fertile, is as yet undecided, as so little land is cleared. The northern parts will have the preference as rice countries, on account of the great plains; as the southern parts will be found preferable for perennial cultivation, on account of their approaching more in climate to the equatorial regions. The complaints of natural barreness of soil, and inaptitude for cultivation said to exist in the Malay archipelago, and so much complained of by Marsden with reference to a great portion of Sumatra, is not applicable to Tenasserim.

V. *The great choice of lands* to be had, forms another great advantage in a beginning colony.

There are as yet no conditions laid down by government under which lands are given to private individuals, probably on account of no body having yet asked for land. Probably the same, or similar regulations will be fixed upon, which exist at present in the Straits of Malacca.

It should then be remembered, that the cultivation will probably take a different turn from that in India, viz. that very few annual, but mostly perennial plantations will be reared, such as of spices, coffee, betel-nuts, &c. and that short leases would be detrimental to the landholder.

The price of land where so much is lying waste, and where it should be the interest of government to keep as much as possible of the land occupied, will probably be insignificant in the beginning. Under the present system, borrowed from the ancient Burmese, every part of land occupied or not is the property of government, the natives merely farm it, and pay for the productions raised upon it nominally 25 per cent ad valorem.

VI. *The greatest variety of articles which can be raised in Tenasserim* is another great advantage which the provinces offer; not only every tropical production thrives well, but also exclusively intertropical articles promise to succeed in the southern parts of Tenasserim, and amongst those, some of the most valuable known, which are confined comparatively to a narrow sphere, such as nutmegs and cloves.

VII. *The combination of agricultural with mercantile pursuits* forms an additional reason to select this part of India in preference to many others. I mean, a planter can combine the sale of valuable spontaneous productions of nature which surround, with his chief pursuits in agriculture.

As the greater part of valuable productions can only be obtained from plants which require several years' growth before they arrive at maturity, the time which intervenes is lost to the planter in expectations, and can be turned to account by converting into practical use the following productions, which to this day are unused, though of intrinsic value, viz.—sticklac, the gamboge, the caoutchouc, the different gum resins, the wood oil, the black varnish, the aloes, and sandal woods, the native dyes, and several tanning substances, &c. &c.

VIII. The last advantage which the provinces offer as a colony, consists in *the facility of getting good labourers;* though the country is thinly peopled, and the Burmese on account of their independence and want of skill will never be extensively used as labourers, yet the Chinese can be brought into the country; it would only be necessary to direct the tide of their emigration from Singapore here, and certainly if Chinese once knew that they could find remunerating employment they would flock of themselves to these shores.

This is a matter of vital importance just at present, when the effects of the emancipation of negro slaves has involved the greatest part of the tropical colonies in embarrassments which threaten some of them with ruin. The advantages of having an European colony would be briefly the following:—

1. It would be the best means of rendering the country in the shortest possible time remunerating. Until now it has been a loss, and though it has made a gradual progress towards the better, yet it will be a considerable time before the native population augments sufficiently to render the country a source of revenue to government. It must besides be kept in mind, that should circumstances ever allow of settled government in Pegu, the greater part of the population in the north will emigrate from Tenasserim and return to their old homes, where they will have protection.

2. European scttlers would soon call into practical use the manifold resources of the country.

3. United with the mother country by mutual interest, England would very soon gain by a new commerce with a new country, and by it be benefited.

4. When grown up to a greater community, an European colony would be considered as a safe position against millions of people inhabiting India. Of the different articles which are found in the provinces, or which can be raised, I have treated in my previous reports, I therefore confine myself to mentioning some of those which promise to become of the first importance to European settlers.

Spices.—Spice cultivation is excluded from India Proper; all attempts to transplant trees from the Malay archipelago have not answered the expectations. When the fruit ripens it is imperfect.

The nobler spices seem to be confined to a narrow sphere in interequatorial climes, confined to countries which are not far distant from their native place, the Moluccas.

It is only lately that the spice plantations in Penang (begun under apparently unfavourable auspices) realized the most sanguine expectations of success. They are already, and will be more in time, the true source of prosperity of that small colonial settlement.

Penang has a great resemblance in productions and climate to the southern portions of the Tenasserim Provinces. It may reasonably be conjectured that almost all valuable productions succeeding there will thrive in the Mergui Province. All that hitherto have been tried, have succeeded. Young nutmeg trees are growing in Mergui very well; they are not however sufficiently grown up to know by experience whether they will be equally productive.

There is a practical adage amongst the natives, which I am inclined much to credit, that where mangosteens thrive, nutmegs will grow and bear fruit.

Mangosteens are equally obstinate regarding locality. They do not grow well in India, and produce but indifferent fruit in Ceylon and the southernmost parts of the Peninsula. They

do not grow better in the northern parts of Tenasserim; Mergui is the northernmost limit where they attain perfection, and so it probably will be with nutmegs. Should nutmegs bear amply in Tenasserim, their introduction and multiplication will be of the greatest advantage, as no branch of tropical cultivation is as yet known giving such an ample return as nutmegs.

It is probable that the high prices of nutmegs will diminish with the increase of the number of plantations, but even half of the present price would be a very ample return. It is rather doubtful whether clove trees will succeed in Tenasserim; they grow but slowly, and are very delicate. There is only one tree which has blossomed this year, for the first time, in Mergui Province.

Coffee plantations are a branch of tropical agriculture which is particularly well suited for every part of the Tenasserim Provinces. Experience has taught, that coffee plants produce amply, and that the coffee obtained is of a superior quality. Some reared by Major MacFarquhar in Tavoy can be compared with the second best in Java. The young trees begin to bear in the third year, and are in full bearing after five years. The virgin soil if cleared, and burnt down forests in valleys on the sloping sides of mountains, are the best suited for its growth. Such an article of the first importance in the European market, does not want a particular recommendation.

Areca palm plantations are also of importance to the European planter in the southern parts of Tenasserim, where they attain high perfection. They give certain returns, which are not inconsiderable; they require however seven years' growth before they produce fruit.

The natives have only since the British occupation laid out areca plantations on a large scale. The provinces do not yet produce sufficient for the consumption of the country, and the nut is imported from Sumatra, and Penang.

Should arecas, as lately they have begun, be continued to be transported to Europe for the purpose of superseding oak bark and sumach for tanning purposes, the importance of areca plantations would greatly increase.

Cocoanuts.—In all tropical countries, having a large extent of

sea-coast, cocoanut plantations are chiefly remunerating if the native population is accustomed to use these nuts as a part of their diet.

To the European settler they are important, for the sake of manufacturing the oil for exportation to Europe. The country immediately bordering on the sea-shore is that best adapted for cocoanuts, because they require to be somewhat under the influence of salt water to thrive properly, and it is a part of the country otherwise unavailable. The borders of the mangrove jungles can be profitably employed in this way.

Nipah cultivation, though never as yet carried on by Europeans, seems to call for particular attention. The leaves of this palm are used for thatching common houses, when converted into a kind of thatch the price is generally from two to three rupees per thousand. But what merits particular attention, is the making of sugar from Nipah toddy or palm wine. Experiments have shown that the quantity of sugar is greater in proportion to that obtained from sugarcane. The chief difficulty arises from the rapid fermentation which the palm wine undergoes.

Nipah grows only near the sea-shore, in places which are under the influence of the tides; boats therefore can approach within a short distance of the plantation. It would be necessary to have a copper boiler on board of one of the boats, and to boil the just collected juice to prevent the vinous fermentation. In this way a great quantity of sugar could be obtained, which could be disposed of with considerable profit at low prices.

These are the chief perennial plantations which would be the most profitable to European settlers.

Annual plantations are less remunerating, but the returns are quick, and the majority would probably begin with them, except men of capital, who can afford to wait.

Annual plantations however require in the beginning a greater outlay than perennial. We have shown that the country with few exceptions is an uninterrupted forest. It is not only necessary with annuals to clear the forests, but to prepare the ground more carefully, digging out the stumps and roots of trees, and rendering it fit for tillage.

Such thoroughly prepared grounds do not exist in the provinces except those destined for rice-plantations, and those being situated in low localities, are scarcely available for other annuals.

It must be ascertained by experience whether a plantation consisting exclusively of annuals would be remunerating to European settlers. It is doubtful whether Tenasserim in its infancy as a colony, will be able to compete with Hindoostan in this respect. If however any annual plantations on a large scale are to be established, then cotton must be counted among the first. To augment the quantity of new cotton in the British colonies, and to render the mother country independent of foreign supplies, ought to be considered a matter of deep concern.

The East Indian possessions are particularly well fitted for cotton growth. India is the mother country of cotton, yet the original plant is deteriorated throughout India, and the modes of cultivation not understood. In Tenasserim the indigenous cotton plant, or that in use, is still worse than the Indian. It has a short staple, want of smoothness, and a great cohesion to the seed. The greater part of the cotton is sown together with mountain rice, upon newly burnt ground. Four-fifths of all cotton grown are obtained in this manner, almost all being used for home consumption. Other cotton seeds have been introduced since the British occupation, but unfortunately Pernambuco cotton was selected and generally distributed. It proved a failure, as might be expected from an almost subalpine plant being transferred into subequatorial plains, and the failure of the experiments contributed to make the natives think that their own species was better.

Egyptian, Sea Island, and Seychelle cotton have been also introduced lately, but almost all the seeds obtained did not germinate. European settlers well versed in cotton growth would have an ample field for exertions, and it seems that the plains between Ye and Tavoy, and between Tavoy and Palauk, will be particularly fit for the introduction of Sea Island cotton, as that variety likes the atmosphere of the sea and a slightly subsaline soil. For the Georgia Upland plant, the interme-

diate valleys and slopes would furnish an apparently good locality. We have hitherto, however, no experience whatever of cotton growth with introduced superior qualities, and can therefore throw no light upon the probability of success with cotton.

Of the cultivation of the sugarcane I have spoken in my former reports, as well as of indigo and tobacco cultivation. All these articles grow well in these provinces; there are however no known data on which to base how far an extended well attended cultivation would be remunerating, as these articles have been only reared on a small scale for home consumption, and no care taken to replace deteriorated varieties.

In Hindoostan a great proportion of the land is already converted into fields which are actually under tillage, and the people cultivate indigo, tobacco, and sugarcane; in this case it seems advisable to unite perennial cultivation with annual.

The following is the sketch of a plantation upon an extensive scale, which seems to the writer to combine all desired profits from cultivation in Tenasserim, and which seems to indicate the most advantageous method under present circumstances, to be pursued for transforming the virgin forest into cultivated land. It is only applicable to the southern parts of Tenasserim, especially Mergui Province. The first operation is the selection of an appropriated locality with reference to soil and situation. The best soil for the purposes which I am about to indicate, is that which has a layer of humus of at least two or three inches depth, whose upper soil is the red clayish earth, intermixed with a moderate quantity of sand.

Localities where the upper surface is constituted of decomposed granite rocks will be found, on account of the fertilizing quantity of the decomposed felspar, highly advantageous. Should a more than ordinary admixture of calcareous substances happen, as is the case in localities where isolated limestone groups protrude, it will be still better, the vegetation in the neighbourhood of such localities being always distinguished by a particularly luxuriant appearance.

It ought also to be ascertained, whether there be a sufficient stratum of subsoil two or three feet thick, not rock.

Undulatory, slightly sloping hills, and of these chiefly the part near the bottom of the valley, will be the best situation.

Places must be avoided where the waters have not a natural outlet, otherwise they accumulate during the height of the monsoon; besides a noxious inundation, the plantations are liable to be carried away with the good earth; the formation of terraces, and the digging up of trenches and drains, would be for the first settlers a too expensive operation, where unlimited quantities of unoccupied land can be chosen in the first instance.

Particular care in the selection of the locality should be taken to establish the plantation not far from the sea coast, from a navigable river, or at least near a creek communicating with the sea, or river, there being no roads in the country, and the easy transport of the produce being a matter of importance.

Localities should be chosen where the forest is high. The more primitive woods are grown up, the more they possess of accumulated humus, and the less they have of underwood;—the more underwood, the less good the soil, and the greater the number of white-ants, the greatest enemies to a plantation in tropical countries.

After having selected the proper locality, the cutting down of the forest is the next operation. It can only be performed during the dry season, from November to April; trees cut down during the monsoon do not burn well, this is a fact of which it is difficult to account satisfactorily.

The great art in cutting consists in felling the trees in such a manner that they fall in heaps; when they are lighted they burn the more freely, for the greatest trouble does not consist in felling a forest, but in burning it.

A month before the setting in of the monsoon, the whole area cut down is burnt in one day; after this, the always considerable remainder of the branches and smaller trees is cut again, and brought on new heaps, which are repeatedly burnt down, until nothing remains but the bare large trunks, which are never consumed by the fire.

In future times, when wood will be more appreciated, part of these trunks, 30 or 40 feet in length, quite straight, some species yielding excellent timber for ship-building and other purposes, will probably be removed to well situated localities, where they can be dragged by elephants to the water's edge. For the present, there is no demand for timber, and these large trunks are left in the plantation to rot. The aspect of such a plantation cleared and prepared, is not agreeable to the eye of an European accustomed to see clean fields; the standing and strewed large trunks prevent the application of the plough, but in the present description the most profitable mode of plantation is kept in view, and this does not require the plough, for such a plantation is not to become a field, but a garden.

The next aim is to render the prepared soil as productive as a virgin soil can be made. It is not yet ascertained by experience whether it is not advisable to sow in the first instance mountain rice, not only on account of the produce obtained covering at least a great part of the expences of cutting down the forest, but also on account of being a powerful check to the shooting up of numerous weeds, after a few months, notwithstanding constant weeding. The natives affirm that the quantity of nutritive matter of which the rice deprives the soil, is less than that consumed by the weeds.

If rice is not planted, sesamum oil-seed is sown broad cast upon the ashes, young chilli plants planted in rows, and cut pieces of yams planted like potatoes at intervals.

These annual productions enter into the domestic economy of a tropical planter, and the surplus, if the country be inhabited, is bought up by the natives; the labourers also, in most cases, consent to take a part of their wages in kind, instead of money.

The next is the planting of plantain shoots. This plantation is formed on account of the shade which the broad leaves of this plant throws over the young perennial plants, shade being a most necessary requisite in the dry season, and plantains shooting out the quickest, without detaching much nourishment from the soil, and are besides otherwise useful.

They yield, as is well known, an astonishing quantity of

wholesome food. They are cut down after the perennial plantations attain the height of four feet six inches, when they are strong enough to bear the dry season unprotected, and the burnt plantains yield a considerable quantity of potash. At the same time that the forest is cleared and prepared, a nursery for young areca palms is to be established in some appropriate locality. The best arecas for seeds are to be obtained from December to March, and sufficient are at present grown in the southern provinces, so that seed is always procurable. Such as are the largest and apple shaped, are considered the best for planting. They are placed in baskets in layers, covered with leaves or hay, from 500 to 1000, closely packed together, these baskets are kept in cool places, and watered at least once a day.

The outer husk of the areca nut consisting of fibres and a pulpous matter, begins in a short time to ferment and to decay, the nut loses its bright orange colour, gets dark, and after its epidermis is rotten, it remains enveloped in a mass of closely woven fibres.

The fermentation accompanied with a considerable degree of heat, is deemed necessary to further germinations, which become conspicuous after about one month. In about two months, or later, the nut has shot forth a sprout, about an inch in length. This is the time to take the nuts out of the baskets and to plant them in a nursery, at a span's distance from each other, only half covered with earth. In the latter end of June or beginning of July, they are transplanted into the plantation in the spot where they are to remain for ever. They are then generally one foot high, and have shot two or three leaves in the nursery. They ought to be planted in rows at least seven cubits distant, this being about double of the diameter which the crown of this slender palm occupies, and which is necessary to leave ample room for ventilation. At the time of planting, care must be taken that the weather promises rain for a succession of several days. Should an interval in the monsoon take place, which is generally accompanied by a most powerful sun, the transplanted arecas die or suffer considerably. The arecas are the first of the perennial plantations to be taken care of, and they will be found very advantageous. The profits will not

be exorbitant (about four per cent per annum net gain from one tree), but the planter has the advantage of using the ground without much reference to the arecas, as they derive the greatest quantity of their nourishment from the air.

In the course of time, the palm rises with its roots above the ground, which latter are covered with mammillary varices, constantly removing and absorbing during the night their appropriate nourishment.

The palm does not yield fruit before the seventh year, and continues productive 25 or 30 years. After the first planting no further trouble is requisite than to loosen the ground once or twice a year, without the necessity of manuring or watering, provided the young plants have shade the first and second year.

The next to be done is the planting of coffee. Coffee is not yet introduced in sufficient quantity to have a certain number of seedlings available. Sprouting coffee seed ought to be procured from Calcutta from the coffee reared in Mocha. Young coffee plants can also be obtained from Penang at a very moderate price, and they arrive in good health, the passage being short.

Sprouting coffee must be laid out in a nursery, and the coffee trees transplanted when at least a foot high. No particular care is requisite, except that the roots are sunk vertically in the loosened soil, the slightest curve of the tap root of the coffee producing a sickly tree.

The coffee is to be planted between two rows of arecas, the lateral branches of the coffee extending far, and requiring room for expansion. Between each 1000 arecas 500 coffee trees can be planted without prejudice to the soil, as the coffee tree sinks its roots deep in the ground, and thence derives its nourishment. In the first instance the plantains afford shelter to the coffee, in after years the crowns of the arecas. Areca and coffee being planted, the attention is next to be directed towards the spice trees. It being however problematical whether clove trees will succeed, I confine my observations to nutmegs. Twenty paces apart from each other, holes are to be dug, at least four feet deep and 1½ in diameter, and these are afterwards to be filled with the best procurable earth, such as humus, in preference to cow or buffalo dung mixed with earth.

at least a year old, or the best of all, the rotten husk of paddy mixed with earth, yielding a rich vegetable mould, which in the neighbourhood of Burmese towns or villages is always to be obtained.

The nutmeg tree has a tap root descending perpendicularly to a great depth, and which furnishes the chief nourishment. To permit this root an easy penetration downwards, feeding it in the best possible manner, is the reason why these holes are dug.

Considering the very great value of a nutmeg plantation, all the care and necessary outlay are trifling compared with the return. Nutmegs must be procured from Penang. In the Tenasserim Provinces they are scarcely obtainable, and only at an exorbitant price. When the holes are prepared the spice plants are to be transplanted from the nursery, but such only selected which have at least obtained the height of one foot. Each tree separately is to be surrounded with a frame-work of sticks and lateral shades, to be made from nipah palm leaves, the top only loosely covered with leaves, to permit the dew to penetrate, and in the dry season an earthen vessel is to be suspended over the young tree, perforated with holes through which constant moisture is made to drop upon the young plants. All these operations should, if possible, be performed in the first year, to save time.

A careful weeding, if paddy is not planted, is unremittingly necessary the first year, to eradicate all plants the seeds of which germinate very easily in the much loosened and rich soil. There are plants which are particular to newly cleared places belonging to the families of Tiliaceæ (Triumfetta the most common) Malvaeæ, Gramineæ, Convolvolaceæ, &c. &c. which are certain to be found even in the centre of a primitive forest, in cleared places where before, not a specimen of these species could be found for miles in the vicinity. Most of the roots of the burnt down trees shoot again, and must be twice or thrice destroyed before the roots decay.

In the second year, annuals can yet be reared in the intervals between the young trees, chiefly sesamum oil plants, cotton, and indigo; it would however be detrimental to take from the soil

more nourishment in the third year by again planting annuals. By this it will be perceived that a plantation laid out in this way does not yield a return before the seventh year; but that the revenue then increases in such a ratio, if laid out on a somewhat large scale, as to render the planter comfortable and independant after ten years.

The first and second year the settler will scarcely gain more than his livelihood by the value of the annuals; from the third to the seventh, the coffee alone will remunerate him; after the seventh year the arecas begin to bear; and after the eighth begin the crops of nutmegs.

A plantation of 50,000 arecas, 25,000 coffee, and 7,500 nutmeg trees would therefore yield as follows:—

Annuals.

1st and 2nd year,	Trifling.
3rd year coffee at an average of two annas net profit from one tree,	3,125
4th, 5th, and 6th year,	3,125
7th, 8th, and 9th year, arecas at 4 annas per tree.	12,500
Coffee,	3,125
Total,	21,875
10th, and following 7 years, nutmegs at 10 rupees per tree,	32,500
Arecas,	12,500
	45,000

It must be observed that the calculation is taken from 3,250 instead of 7,500 nutmeg trees, which the colonist originally planted, because half these trees will probably be males, which are useless, and are to be cut down, except one for every twenty females, which is quite sufficient to impregnate them.

It is to be lamented that we know as yet no distinguishing mark to discern a male or female nutmeg tree before they blossom. It is therefore necessary to plant 3,250 young trees more, which after 8 years will again turn out half males and half females,

and so it ought to go on, till nothing but females, with a proportionate number of males, are obtained.

It will also be seen, that in the last calculation no notice is taken of the coffee trees.

When however the nutmeg trees grow larger, it will be advisable to cut down the coffee trees, to leave room for the expansion of the first, much more so as the return from coffee is trifling compared with that of nutmegs.

The same is to be observed of arecas, which after twenty-five years begin gradually to produce less; they ought also to be destroyed, to leave nothing but nutmegs, which continue to yield annually more.

Nutmeg trees are said to grow eighty years, and to attain a very large size; we have however no proofs as yet that they will be in these latitudes as lasting as they are in their mother country.

The return of nutmeg plantations increases annually, and in after years is much higher than ten rupees per tree. There are trees in Penang, which yield annually from 30 to 40 dollars, though not yet full grown. They bear almost without intermission throughout the year.

It would be advisable to use the slender stems of the dead arecas for the purpose of training upon them the pepper vine; it is however rather probable, that a planter who gets such an ample return from his nutmeg plantation will not take the trouble of beginning a new mode of cultivation with pepper, which after all does not last more than three or four years.

This now detailed method of cultivation seems the most promising to be followed up in the southern parts of Tenasserim by European settlers, insuring the most solid and ample return of the outlay of the capital, surpassing by far the most ample revenue the sugar plantations in the West Indies ever yielded. Spice is a new branch of tropical agriculture, or rather horticulture, sprung up only in the course of this century; formerly the Dutch government monopolized it exclusively. Penang is hitherto the only British colony which has introduced it, and which begins to astonish the world with the immense profits the owners reap from it. It must however be considered,

that only men of some capital are able to begin such plantations, as they must be able to wait at least seven years before they begin to see the profits of their outlay and industry. Formerly nothing was introduced, and nothing cultivated in the provinces, that did not spontaneously occur, except some fruit trees and some of the most common articles of tropical agriculture.

Of American productions, tobacco, pine-apples, guavas, and anotta (bixa orellana) are universally diffused. The durian tree which forms the greatest delicacy among the Burmese, was introduced from the Malay countries, after this came the mangosteen from the same quarter. Though arecas are every where planted in the provinces, they are not extensively planted; and the climate above the 15th degree of latitude seems no more congenial to them. In Mergui Province, since the British occupation, plantations on a large scale, even as much as 10,000 trees, have been laid out by the Burmese, and are augmenting annually.

Mangosteens are a later introduction, and are attended to by the Burmese with great care in Mergui province. Scarcely one-twentieth part of the trees planted are yet bearing.

The Burmese would certainly also plant nutmegs and cloves if they could but procure them. Government would therefore confer a great boon on the natives, by establishing in the southern parts a nursery of productions from the Malay and other countries, and divide them gratis to a deserving people. A kind of practical botanical establishment, on a small scale, would be highly useful.

In this should also be cultivated many of the wild growing trees, deteriorated in their jungly state, gradually to be domesticated by cultivation, and then exported to other parts, or laid out in experimental plantations. Such are the various kinds of caouchouc yielding trees, the wild gamboge, the sandal-wood trees, the sassafras, the black varnish, the cajeput-oil tree, &c. &c.

Many plants from the Malay countries when first introduced into Tenasserim, (considering this, as an intermediate stage), could be from hence transplanted to Bengal and Upper India, as it has been generally observed that a gradual ac-

climation is highly advantageous to the introduction of plants of different latitudes. The establishment of government spice nurseries, would be but following the Dutch system now introduced into Java.

The government monopoly there has been discontinued, and the private establishment of spice plantations encouraged; the government not only promising to supply every person with all plants required, gratis, but also to give instructions and directions how to proceed to ensure success. How much government would gain by such a process, shewing at the same time that the natives are not averse to introduce new modes of cultivation, can easily be illustrated.

Areca plantations are but a new branch of cultivation in the southern parts of Tenasserim. Ten years ago not more than 60,000 trees altogether were planted, the number rose in 1837 to 40,000 bearing trees, and 80,000 newly planted. In the year 1839 about 30,000 more were found. The customary tax due to government upon all produce is 15 per cent.

Suppose that instead of 150,000 areca palms, so many nutmegs were planted, which when bearing yield from 10 to 30 Rs. a tree, each tree taken at 15 Rs. average, the amount of revenue, the government levy, according to the established rule, would be 150,000 Rs. annually from the spice bearing trees alone. Of the necessity of planting out teak forests, I have spoken in my former reports. Without regular new plantations, the teak forests in Tenasserim will soon be exhausted.

One of the greatest riches of the country is derived from its teak forests. Except the teak no other timber is used; a small number of junks annually built by Chinese and other small Burmese craft constructed in Tavoy and Mergui from thingan (hopea odorata) excepted.

The researches carried on this year in the southern parts of the provinces, and amongst the islands, have shewn that this part of the country also is an uninterrupted forest, overgrown with almost the same species of timber which occur in the north. The greatest part of the timber trees valuable for shipbuilding belong to the *Dipterocareæ*, and this family has more representatives in Tenasserim than any where else; the *Hopeas*,

Vaticas, and *Shoreas*, are the most valuable. The *Dipterocareæ* though attaining an enormous size, furnishes an inferior wood.

All these trees, when full grown, are from 70 to 120 feet in height, rising with a straight trunk 40 or 60 feet high, and have, before they throw out any branches, a circumference from 10 to 30 feet.

Teak having been hitherto procurable, and prejudices being entertained against other species of timber, nobody has as yet endeavoured to turn the immense forests of the provinces into practical use.

So greatly is the timber neglected, that in all Tenasserim not one saw mill is as yet established, and strange to say, planks for house building are transported from Penang. To engage in timber with a prospect of success, would however require a considerable outlay of capital. Either a timber trade should be kept solely in view, or ship-building united with it. Ship-building has started up in Maulmain, is increasing, and is the only branch of enterprise in Tenasserim which occupies Europeans; it is however yet in its infancy, and capable of great extension.

If we except the teak, no other timber trade is carried on. The daily increasing demand for timber in Europe, Bengal, Madras, Mauritius, Cape of Good Hope, &c. however, will not permit the forests of this country to remain long unused. A great advantage towards rendering these forests useful, will be found in the great number of rivers and rivulets whose banks are covered with forest trees, and which will afford great facilities of transport.

Not only the inland parts, but numerous islands of the archipelago of Mergui are covered close to the sea-beach with forests, and frequently it will but be necessary to fell the tree, so as to make it fall into the sea, or to drag it only a few paces to the water's edge.

The establishment of saw mills moved by water, will present great difficulties; the sudden rise during the monsoon is dangerous to the strongest dikes, and it would be less profitable to erect saw mills at a distance from the sea port.

Saw mills propelled by steam at the mouths of the larger rivers, seem to promise the best. The felled trees bound

together in rafts could be easily floated down, and by way of the sea, the forest trees from several rivers could be collected at one establishment.

Tin.—In the preceding reports I had the opportunity of speaking about the tin mine to the east of Tavoy, and of the tin found near Mergui. This year having examined the country to the south of Mergui, it was found that the country to the north of the Packchan river is the richest in tin ores of all the districts in Tenasserim. The range of mountains in which the tin ore is found, is a continuation (only divided by the Packchan river) of the Siamese tin territory of Rinowng. The tin is found in the debris of primitive rocks, like in all other parts of Tenasserim, but the grains or crystals are much larger (sometimes of the size of a pigeon's egg) and the soil in which they are buried, yields 8 to 10 feet of tin; while at Tavoy the utmost is 7 feet. There is also tin at Domel Island in crystals, still included in the granitic matri, and likewise on the banks of the Boukpeen rivulet in its higher part. In fact tin is of a very common occurrence in the southern parts of Tenasserim, and probably its richest deposits are yet unknown.

Persons of capital desirous of engaging in the working of tin, cannot select a better locality than in the southernmost parts of Mergui province. Besides being the richest, almost all land transport is avoided, by colonists establishing themselves on one of the smaller rivers falling into the Packchan.

They would however be obliged to provide themselves with every thing from a distance, for the country is entirely uninhabited, and the labourers must be brought thither from other parts.

Were a village under English protection established somewhere near the Packchan, there is no doubt that a number of Siamese fugitives would settle in the neighbourhood. They have expressed their desire to do so, if hopes of being protected were held out to them. If we consider the value of tin, it seems probable that this product will be one of the first which will attract the attention of Europeans, when it is once known that tin, as it is now ascertained, does really exist in quantities which promise amply to remunerate.

Iron.—All parts of Tenasserim are rich in iron. The localities and species of iron found on the main land, I have described in my former reports, and have only to add, that iron occurs equally upon the islands of the Mergui archipelago.

There have been found by me this year, four great deposits or beds of iron; the first about three hours from Mergui, at Maoin, and probably a continuation of it near Pereghiun; the second not far from the entrance of the Lennya river, at an island called Kala-khiung by the Burmese; the third (the richest) on two islands (no name) to the west of Sir John Malcolm's island; the fourth on White Pigeon's Island, to the north of the Packchan embouchure. The ores if smelted, would furnish from 40 to 60 per cent of raw iron. The iron of Tavoy remains however the best with reference to per centage (74 to 80 or more) quality; and the preference should therefore be recommended to those who may be inclined to establish iron foundries.

It is to be hoped that such a valuable article, to be had under circumstances where fuel is but a matter of trifling consideration, will attract the attention of enterprising Europeans with capital.

To the mineral articles of the provinces must be added copper, discovered this year in two localities. The first in the NE. part of the great Lampi or Sullivan's Island, found in veins of quartz, running through transition clay slate, the second in the island of Calla-gkiauk, near Mergui, in a quarry running through gneiss.

Both have been obtained, but in small quantities; the prosecution of researches carried on by mining was not intended, but the bare indication of the occurrence of copper will be found sufficient to those who are desirous of turning their attention to this valuable mineral.

Before the invention of the steam engine, and before this invention was brought into universal application as a substitute for human labour for achieving works previously unknown, or thought impracticable, coal was nothing but a cheaper fuel than wood, and only of advantage to countries destitute of forests. In those abounding with timber, coal was useless.

In the same light the discovery of coal would be considered in Tenasserim. The country densely grown with the finest forest (at Mergui 100 billets of wood 9 feet 6 to 10 inches in circumference, are to be got for 9 Rs.) the population extremely scanty, in a primitive state, the country without manufactures and without commerce, the discovery of coal is therefore for the present of no use to the country.

Coal however being indispensable for steam purposes, the discovery of coal becomes highly important to the country indirectly, and to the whole of India directly.

For steamers navigating the coast, and going from Maulmain to Rangoon, Tavoy, and Mergui, coal is no great benefit.

Not above a four days voyage in a steamer can be performed with wood; an eight days trip from Maulmain to Calcutta is impracticable without coal, and the millions of timber trees in Tenasserim could not have contributed any thing to the accomplishment of a steam communication between the different parts of India.

The accomplishment of the Comprehensive Steam System between the different parts of India and Europe, will in a short time render coal in India a matter of first importance, and Mergui coal, of all hitherto known localities of coal deposits in India, will be the first.

The peculiar advantages with reference to quality, quantity, and locality, have been pointed out in my previous reports; it is only necessary to add, that the discovery of a new deposit, almost on the banks of the great Tenasserim river, not requiring land carriage (except a distance of 1000 yards) will cause a considerable diminution in the cost of the article, and will cause still larger quantities to be brought to light than previously would have been perhaps the case.

When Mergui coal is brought into general use, it will exercise a great influence over the other coal fields in India.

The Burdwan coal supply will be limited to the use of steamers on the Ganges and Burhampooter, and in consequence, the prices of coal used in inland navigation will rise to make up for the defect caused by the discontinuance of exportation.

The Palamow, and Cherra-Poongi coal-fields will either be given up entirely, or if they can compete with the Burdwan coal in cheapness, the latter will suffer still more, the quality of the former being superior, and the demand for coal for the river navigation in Hindoostan as yet so limited, that one of these localities can supply all the wants.

The importation of coal from Europe will probably cease entirely in time, for it would be very strange indeed, and only the effect of very bad management, if coal-fields well situated, with a material of a superior quality in the hands of one and the same nation, and many thousands of miles nearer to the place of consumption, should not render India altogether independent of Europe.

The first expense of the opening of the Mergui mines will be considerable, and the prices in the beginning high; either the Burmese must be employed, or a population introduced (Chinese suiting the best). In both cases the wages will be high—Burmese, independent in their character, and provided easily with all the wants of life, and induced only to work for high wages; and Chinese to be introduced into a new country, must in the beginning also be enticed by the prospect of higher wages than they can get elsewhere.

The expense of machinery and the setting it up, will be greater than in any part of India; vessels arriving empty will only carry coal for higher freight, and counting only to be remunerated by the return cargo.

These are the difficulties which will throw themselves in the way the first years, but gradually the coal will become cheaper.

Coal could be turned advantageously into use, by working the mines of iron in the neighbourhood of Mergui with coal; the nearest one is but a few hours distant. Mergui will undoubtedly become a considerable place; colonists ought to be advised to settle in the neighbourhood, and men of capital to resort there in preference.

1. It being that part of the country which possesses the coal mines.

2. It being peculiarly adapted for perennial plantations, and alone fit for the introduction of spices.

3. It being well situated for commercial intercourse overland with Bankouk, and in general with the population scattered along the gulf of Siam, being placed in the narrowest part of the Malay peninsula.

Besides the rich mines of the country, there is also antimony, silver, and gold, in the country, which are, however, to men of capital of minor importance.

Antimony will perhaps be worked, if Maulmain continues to be a flourishing settlement, on account of its neighbourhood to that place. The silver mine to the north of Maulmain is too engirded by the mountains, and its value as yet too problematical to recommend it to private enterprise; and gold is to be found in too small quantities in the rivers to merit attention.

The fisheries are not unimportant, as may be well expected in a country which possesses 600 miles of sea-coast; but they are the most considerable amongst the islands of the archipelago of Mergui, where the young brood find an appropriate shelter between the inner islands. In the month of February and March, the sea is covered for miles with a green mucilaginous mass, which envelopes myriads of spawn; the variety of fish is great, and Mergui is famous for the most delicate species.

The fisheries are farmed out to the natives; Malays and Chinese share in this occupation, but it is carried on on a very diminutive scale.

During some periods of the year the fishermen retire to certain spots on the uninhabited islands to the south of Mergui. It is however, done very imperfectly; the fish is spread over a framework of mangrove trees, and permitted to dry in the sun, being daily trodden with the feet twice. No salt is ever employed in the curing of fish. Certain kinds of fish are bought in the market smoked.

They have small and imperfect nets, these being sufficient to get the quantity desired near the towns and villages; fish are caught in stakes.

Some little fish oil is also collected. It seems that a fishery carried on by Europeans, on a similar scale with that of Newfoundland, would be much more remunerating, as a ready market here and in India will always be found, cured fish forming an univer-

sally relished condiment and ingredient of the native dishes. It must be remarked that whales are not uncommon in the Mergui archipelago. There are pearl banks to the south of Mergui; two were worked once at the time of the Siamese occupation; one situated on the east side of Sullivan's Island, the other on the east side of *Collie* (?) Island, stretching across to the main. This occupation is said to have formed a considerable source of revenue to the government.

Once an attempt was made by Mr. Maingy, the commissioner, to revive the pearl fishery, but it was given up for want of divers accustomed to dive to great depths, the best pearl shell-fish being found at the depth of ten or twelve fathoms. This source of revenue lies entirely dormant at present. The natives are ignorant of the necessary proceedings.

Sometimes pearls of a middling quality are found by the Seelongs in the indicated localities at low water, and these bartered to the Chinese who traffic with the remnants of that race. How far it would be remunerating to men of capital to engage in this pursuit, can of course not be said at present, as even the extent of the pearl banks is not known, as well as the quantity obtainable from shell-fish attached to rocks at a greater depth.

The edible birds' nest caves form a not inconsiderable source of revenue to the provinces in the southern parts of the Tenasserim Provinces.

They are at present farmed out to Chinese and Malays; those in the Mergui archipelago are again farmed out to other Malays, who come from Penang during the dry season to watch the caves, and to build and repair the frameworks necessary for collecting the birds' nests attached in the sombre caves, on the most lofty, dangerous, and inaccessible parts. This branch of occupation it seems does not suit Europeans, and will probably remain for ever in the hands of Chinese and Malays. Irregularities will occur as long as the localities which the swallows frequent are not ascertained, which is the more difficult as these birds change their abodes; so that many caves (such for instance in the Elephant rocks to the SE. of Domel) are now almost entirely deserted.

To these productions of the sea, which enter into the article of commerce, must be added tortoise shells, mother o'pearl shells, sea-slugs, and amber, which are found among the islands of the Mergui archipelago, and which are entirely neglected, or triflingly collected by the wandering Seelongs.

Commerce.—For commercial men (Europeans) the Tenasserim provinces are a poor resort. In a new country it requires a long time before a regular commercial intercouse can be established, whereas in Tenasserim reciprocity is wanted.

The Burmese have been too long separated from India, and much more from Europe; they know little of the commodities of either country, and they know not how to use them. What they want for their own comforts, and do not produce themselves, is all found within the sphere of their own country; what Tenasserim does not produce of their luxuries, superfluities, or commodities, Pegu and Ava do. Very few articles of European or Indian produce have found their way to Burmah. These few articles are limited to cotton piece goods of an inferior quality, some broad cloth, iron, tobacco, and opium; and the majority still use their own home-spun cloths, and content themselves with inferior tobacco, while only a small portion of the community (chiefly the richer class) indulge in smoking opium. All the rest of the commodities imported is for the use of foreigners in the provinces, and these being comparatively few, their wants are soon satisfied.

The generality of the Burmese people have no inducement to become acquainted with foreign commodities, they are too widely different in their habits, customs, and wants, from Europeans, and they possess as yet no ambition to procure the new luxuries; they have besides no reason to exchange their surplus for new articles. Yet Burmah in general, and Tenasserim considered as a part of it, might be a country of commercial importance, possessing many articles intrinsically of value, which would be appreciated in European markets, and which require only to be collected, being partly the spontaneous productions of nature, which are now entirely unused, and will remain so as long as there exists no mutual commerce. Even supposing that the natives could be induced to collect these articles at a reason-

able price, vessels that would arrive to carry away that produce have nothing to bring, and consequently their profits would be doubtful. Under such circumstances, trade will only be confined to Asiatics, who are much better fitted to provide the natives with the little commodities they are in want of from foreign parts.

Should the provinces become a resort of civilized men, whose wants are more numerous, and with whom commodities are become by force of habit necessities, then commerce will spring up, and the resources of the country, the spontaneous productions of nature, as well as the produce of the cultivated soil, will be called forth in a short time.

The Tenasserim Provinces are well situated to become a commercial emporium; they could be made the intermediate link, uniting the Chinese world with India and Europe.

An overland communication between China and the British Indian possessions has long time been deemed very desirable. From two points there is a possibility of accomplishing it, either by way of Assam, or by way of Tenasserim. Though Assam is much nearer to the Chinese dependencies, yet the nature of the country to be traversed seems to throw such difficulties in the way, that it is not thought of at present. Maulmain is much more distant from China Proper, but there are, as far as is known, no great natural difficulties to overcome, to establish a commercial road at least with Chinese Yunan, the southernmost province. The Chinese themselves seem to be desirous that it were accomplished, and the fact that a Chinese caravan was actually on the road to Maulmain, corroborates this opinion.

The difficulties are only of a political nature, and are to be sought for in the jealousy of the Burmese and Siamese governments, and the apprehensions of the Shan states, to the north of Amherst Province. Should the relations with Burmah be placed on a solid footing, there is no doubt that an overland trade with China and the British Indian possessions would spring up. Chinese caravans come annually to Burmah, and within a short distance of the northern parts of Tenasserim.

The articles most in demand, would be European and Indian

goods of little bulk, such as opium, piece goods, cotton yarn, and bullion, and they could be sent into the interior parts of China in this way more direct than at present, for all articles imported by British vessels must be from the sea ports to the distant inland provinces of China; and though it seems at first sight to be a very long journey from Maulmain to China, yet it is a shorter one for the western provinces of Yunan, Mungfan Kahang, and Amdoa, than through Canton; and several of these, which are unable at present to get these goods at all, could be provided with them in this way.

If the Chinese import from Burmah now almost nothing but raw cotton of an inferior quality, which is very bulky, how much more would they be inclined to transport the above mentioned articles.

The Russians set an example in their trade with China; their communication embraces the longest known commercial overland road—from Astracan over great part of Siberia, to Kaichta, from whence they have to pass the Duary Mongalian steppes, before they reach the great wall, the entrance to China Proper.

The distance from Maulmain to the southern parts of China is trifling, compared with the Russo-Chinese road of commerce. The southern parts of Tenasserim are well situated to carry on a commerce with Bankouk. The British intercourse with Siam has been greatly neglected, which is the more to be wondered at, as that country abounds in most precious articles, and its ruler seems to patronize commerce. The treaty concluded with Siam does not preclude British Indian subjects from trading overland; there has been however hitherto no inducement to do so. Mergui would be the place to carry on a trade across the isthmus, which in a straight line does not there exceed eighty miles, thirty at least of which, as far as is known, can be accomplished by water on this side. The country does not present any great difficulties, and a road formerly existed from Tenasserim across the country, which Alompra followed with his army, marching to besiege Bankouk. Should such a road be opened again, it would call into operation the coal mines discovered last year—which are situated on this road, not far from the Siamese frontier, which for the present

remains unused—as the late discovered locality of coal presents far greater facilities for transport.

Should the Tenasserim Provinces advance in prosperity, it is very probable that the gulf of Siam will be united with the bay of Bengal by a railroad. To form a canal through the isthmus of Kraw, as has been once proposed, would rather appear a chemerical undertaking. I had opportunities of examining that portion of the country this year, navigating the Packchan river as far as it is navigable for vessels of some burthen, and the natives informed me that an interruption exists in the range of mountains, which runs through the peninsula, and that another navigable river (Telim-foung) is met with at a distance of six hours march on the other side; but whatever localities might be chosen to traverse the peninsula, a railroad in a tract of country abounding with timber, iron, and coal, would at any rate be preferable to a canal.

For the present such an undertaking must remain a theoretic scheme; it would only be recommendable in the event of Tenasserim being occupied by European settlers; the relations with Siam, as a country full of resources, better understood; and the commercial intercourse with China not only re-established, but also become more vigorous, and still more extensive. In the latter case a speedy communication between China, India, and Europe, and across the peninsula, through Tenasserim, would be very beneficial.

Recapitulation.—Recapitulating what has been said in the foregoing pages, we are led to the following conclusions.

1. That Tenasserim is particularly well situated for an European colony, on account of the quantity of good land unoccupied, the variety of tropical productions which can be raised, the salubrity of the climate, and the facility of communication, possessing a large extent of sea-coast with numerous navigable rivers.

2. That the natives will be no impediment in any way to European settlers, as they are in many respects in Hindoostan.

3. That Tenasserim therefore ought, in preference to any other part of British India, to be chosen as a resort for Europeans who are desirous of occupying the land as agricultural settlers.

4. That it possesses, besides, great inducements to men of capital to employ their money productively here; the timber forests, the tin, iron, and coal mines, besides other spontaneous productions of nature, being inexhaustible riches of value.

5. That mercantile speculations cannot be remunerating at present, there being scarcely any demand for foreign produce.

6. That the situation of the country is such, as to point it out as the commercial high road in the north between China; and in the south, between Siam and British India.

Note.—The MS. from which this valuable report was printed abounds with copyist's errors, on which it has been sometimes impossible to venture even a conjectural correction.

Memoir on the Climate, Soil, Produce, and Husbandry of Afghanistan and the neighbouring Countries.—By Lieut. Irwin.[1]

PART IV. *(Continued.)*

Toree.

209. The climate is here milder. The chief products are rice and mash. The lands are irrigated, the houses flat-roofed; timber, fuel, and fodder are easily had. The chief live stock is goats, and next, cows and buffaloes. The carriage is by mules, and the natives carry rice and mash to Cabul from their own valley, as also salt from the eastward. The cultivation is considerable, and the villages Zeran and Koorman are long ones.

Upper Bungush.

210. This country seems to correspond in most circumstances to that of Toree. The chief town is Honga, which has 400 houses. The country is strong, and is under its own chief, whom the king seldom displaces. It yields good honey, and is well wooded and watered. Rice is exported to Cabul, generally by the road of Ghorbund. The vallies are well inhabited. But little use is made of tents.

[1] Continued from p. 65, vol. ix.

Khost, &c.

211. Khost and some neighbouring vallies are well watered, and the chief produet is rice. The mountains whieh eonfine them, afford the natives plenty of timber, fuel, and pasturage. Cows, buffaloes, and goats are the chief stock. Little information is to be gained eoncerning this part of the Cabul dominions. It may be observed of the eastern parts of that monarehy, that the middle portion of it although not remarkably unfruitful, eontributes very little either in men or money to the public strength. Tamerlane made his mareh to India from Toorkistan through Ghuznee, and thence by the road called Hazar-durnkht, whieh penetrates the Jadran range, he reached the low country, whieh is watered by the Koorm, and its numerous braneches. In modern times, Cabul is a place of more note than Ghuznee, and the northern road to India through Cabul and Peshawur is the frequented one; in every point of view it is preferable to the middle one. The great southern road from Persia and Khoorasan leads through Candahar, either to Deraghzee Khan or to Shikarpoor, and it is also preferable to the middle one in most points of view. The vallies of Khost, &c. are well cultivated, and their lands irrigated. In former times a greater number of Ghiljies resorted to this quarter for pasturage in the winter than now.

Jadrans, &c.

212. The Jadrans and Mookbuls live in a rude state, in very small villages, and their chief subsistence is from their flocks of goats; after whieh, we may reekon their fields, whieh yield them wheat, rice, and some other things, and are in general irrigated. They receive some provisions from the Jajees and Torees, after whom the vallies of Jajee and Toree are named, and merchants from Cabul carry cloths, &c. into their country, bringing back ghee of goats' milk, and some goats. The country is very strong, and never pays revenue, nay, in the present low state of the royal authority, certain petty chiefs of the Jadrans have compelled their neighbours on the skirts of the table land to pay them revenue instead of the king. They use partly houses and partly blaek tents, which they make for themselves of goat hair.

Foormul.

213. This is a small district, but has been mentioned in history, and has found a place in maps already existing. It is situated near the junction of the Jadran range with the range of 32½°. It is drained to the eastward into the Koorm, whereas the country called Zoormul, which lies west or north-west of it, composes part of the table land of Ghuznee, and is drained south or west. The inhabitants of Foormul speak Persian, and reckon themselves 4000 families. The chief town or village is called Orgun, and may have 1000 families; there is no other village of any importance. The people subsist by tillage, and also carry on a considerable trade, conveying salt and iron from the eastward to Cabul. Their chief stock is perhaps cows and goats; and camels are the chief carriage. Their hills abounding in pine, timber and fuel are easily procurable. Their houses are flat roofed. They raise quantities of good apples, and sell a small quantity of grain to their eastern neighbours, the Wuzeerees.*

The chief products are wheat and barley, and they raise a little maize.

Kohat.

214. This is an agricultural country, and the two crops are probably equal. The chief products are rice and wheat; some provisions are exported to Peshawur. The lands are commonly irrigated, and that chiefly from springs. The wheat and barley are autumn sown. For fuel they burn olive and shrubs, and timber is procured from Upper Bungush. The houses are flat roofed; cows are the chief stock, and camels the chief carriage. The inhabitants drink chiefly from springs. Kohat may have 5000 inhabitants. The villages are small, and on a given surface the populousness of their districts is less than that of Peshawur. At Kohat they cultivate grapes, figs, and mulberries, and but little other fruit; the perfume they extract from that species of the willow called Bedi mookh, is much esteemed.

* These live in a rugged country, and derive their subsistence from tillage and from flocks of goats.

Malgeen.

215. In this country, which belongs to the Southern Khutuks, the chief subsistence is from tillage; near Malgeen there is more rubbee, and wheat is the chief crop; but near Toree, which lies on the road to Bunnoo, the khureef is greater, and bajra the chief crop. Very few of the fields are irrigated, some bajra is said to be exported to Bunnoo, and a great part of the kingdom is supplied with salt dug in this district; the trade of salt is chiefly in the hands of strangers. The villages are generally small, and there is much waste; for fuel they use shrubs, and they drink from streams, springs, and tanks. In the quarter of Toree are some wells; cows are the chief stock; bullocks and camels perhaps the chief carriage. The natives live in flat roofed houses; those who visit the neighbouring hills in summer, use, I believe, partly black tents, and partly rude sheds of shrubs and grass.

Bunnoo.

216. Bunnoo is an agricultural country, and is well cultivated and peopled. The khureef is the chief crop, and barley, rice, maize, and wheat are said to be the chief products. Some rice and coarse sugar are exported, some wheat and bajra imported. The villages are very numerous, but small. All the lands are watered from branches of the Koorm, but some of the natives drink from wells. Timber is cheap, being brought down on the river, and the houses are flat roofed. For fuel they burn both wood and dung; straw is cheap; provisions are cheaper than at Peshawur. Bullocks are the chief carriage; cows and buffaloes are kept to an equal value. The turmerick of Bunnoo is exported to all quarters. There are no wastes except on the frontiers of this district.

Eesa Khel.

217. This is a narrow district, but is well cultivated by independent farmers. It is best peopled towards the Koorm, where they water the lands from a cut they have drawn from that river. In the northern quarter towards Kalabagh, the lands are lulm, but have the advantage of khwurs. In neither is it easy to find a well. The natives drink from the

Indus and from canals for irrigation. Grain is exported to Kalabagh, and probably other quarters. The two crops are perhaps equal, and wheat the chief product. They live partly in thatched and partly in flat-roofed houses.

Moorwuts.

218. This tribe lives south of Bunnoo, and their country is by some included in Daman, by others not. The product seems to be bajra, and most of the lands are lulm. Their chief stock seems to be cows, which they pasture in the wastes, in the same manner as many other Afghan tribes pasture their sheep; they themselves while thus occupied, live in tents made of black goats' hair, and generally fenced with shrubs. They keep a considerable number of camels ; their villages are small.

Daman.

219. This is an agricultural country, notwithstanding its pasturage is so famous, for it is strangers who reap the chief advantage from it. On the whole the two crops are equal ; in the southern part in which Drabund is situated, the rubbee is the greater ; in the northern, in which lie Tuk and Tukwara, the khureef. The greatest product is bajra, and after it, wheat and barley. Considerable quantities of cotton are raised, and the greater part is exported to the dominions of Moohummud Khan. Bajra and jooaree are in general cultivated lulm, but other things are more commonly irrigated. The Gomul loses itself in the northern part of the Daman (see paragraph 40). There are also a few dams. Many of the natives live by trade. There is little fruit save dates ; cattle are the chief stock, and their sheep are both of the heavy tailed and light tailed species. Camels are the chief carriage, and considerable numbers are bred. Some of the mountains, especially that which the Afghans call Kuse Ghur, and others Tukht-i-Sooliman, abound in fir, which afford the neighbourhood timber, fuel, and also torches. The commonest fuel however is from the Guzree, which in certain quarters covers great spaces of uncultivated ground. The natives live in flat roofed houses, excepting those who go and come between the lower and upper country for the sake of

trade. The villages, with some exceptions, are small, and there are wastes of considerable extent. The term Daman is by some applied to a great extent of hills of moderate temperature which lie west of Daman, properly so called, and by that mode of reckoning, the Sheeraness, Oostwances or Troorianees (as they are more properly called) Doomtanees, and part of the Wuzurees would be considered as inhabitants of the Daman; their country is very waste and ill peopled, but in the winter there is a great resort of the Ghiljies and others, chiefly from Zoormul, for the sake of pasturing their sheep. These strangers think they have a right to a pasturage without stint. Those who proceed onwards to the plain and into Mukulwad are compelled by Moohummud Khan to pay a tax for the grass they consume. In this hilly part of the Daman the rubbee is the chief crop, and cows and goats the chief stock. They drink from springs and streams, in the plains there are also some wells; the inhabitants of the hills make some use of tents.

Mukulwad.

220. Tillage is the chief source of subsistence, and the crops I conceive to be nearly equal. Wheat, barley, chunna, and jooaree are the principal things raised. There is little grain exported or imported; most of the lands are lulm, a part of the rubbee being raised on moist lands, which during the rainy season had been covered by the rain; but the quantity of sunk lands is here much less than in the Kuchhee, which is east of the river in Mooltan, or Buhawulpoor. I have formerly mentioned that such lands form a class by themselves, and are called *seo* (see paragraph 166). There is but little good timber within this district itself, yet they have flat roofed houses covered with wood of the date tree, guz, and sheeshum which grow in the country, and some with wood from other quarters. The guz and shrubs are the chief fuel, and are cheap. Fodder is moderately cheap, though the hard clay of this district be naturally ill clad with grass; the soil is not the most favourable for many species of grain, but the present desolated condition of the district is chiefly owing to the oppressive government. There are considerable spaces of hard clay

without cultivation or much jungle. In the southern part we find a great deal of thick thorny jungle growing on a good soil. The villages are small. The chief carriage is by camels and asses. Cows and sheep are the chief stock, and in some places buffaloes exceed any other stock.

Kuchhee of Moohummud Khan.

221. This tract has a great deal of seo land, and the rubbee is by far the greatest crop. The villages are of moderate size; some tracts of good land are covered with grass jungle, and some of the houses are thatched. Fodder and fuel are plentiful. Great quantities of turnips are raised, and provisions of most kinds are cheap. The chief carriage is by camels, but the petty trade of the country is carried on asses. The people drink from wells.

Thun of Moohummud Khan.

222. In this tract are kept great numbers of sheep; and pasturage is fully as important as tillage. Where water is moderately near, they raise barley and some wheat by means of wells, but they have no chunna. The khureef crop is much the greatest, and is perhaps all lulm, and comprehends scarcely anything but bajra and moth. The villages are very small and at great distances. The ground is chiefly covered with a jungle of grass and thorny shrubs. The houses are thatched. Grass proper for fodder is very scarce; nor is there any timber, but there is abundance of fuel from shrubs. Camels are the only carriage. Some grain is imported from the Kuchhee.

Dera Ghazee Khan.

223. This is an agricultural district; towards the river are some seo lands on which they cultivate rubbee, especially wheat. On the upper grounds they raise the khureef which is the greater crop, and is partly lulm, partly irrigated. Towards hills the lands are all lulm, except where there are some insignificant streams or dams. The irrigation from jhulars is more common than from wells. Jooaree is the chief crop. The villages are small, and there is a good deal of waste, both hill and plain;

in other circumstances this district much resembles the preceding.

Dagul.

224. This is a sandy and desert tract, in which bajra is the chief produce; the natives drink from tanks and deep wells.

Shikarpoor.

225. Here, as in Dera Ghazee Khan, jooaree is the chief crop. The proportion of irrigated lands is greater, and the jhular is most used, this district being intersected by branches of the Indus, natural or artificial. The khureef is the greater crop; the villages are of considerable size. The cultivation is considerable, but some supplies of grain are drawn from the west and north. In the town the houses are flat-roofed, but in the villages thatch is more common. The town carries on a considerable trade, chiefly with Candahar, and natives of this place, or whose ancestors have been natives of it, reside in the principal towns of these kingdoms, even as far as Bokhara, acting principally as correspondents to houses in Shikarpoor.

Seeweestan.

226. This is an agricultural country, and exports grain to Shikarpoor, Kilat, and perhaps some other quarters, but its own population is but inconsiderable. The chief place is Gunduwa, which is reckoned to have 12000 houses, including its villages. There is here a stream called Punjwahee, from which they irrigate their fields. Another small stream is divided equally between Dhadur and Sewee. Those places of Seeweestan, which are situated to the north, have often small streams from the hills of the Afghans, to the north of them; still there is more lulm than irrigated. There is very little irrigation from wells. A common practice is to make a bank to confine the water, which after rain is collected on the low grounds, and as soon as any place becomes moderately dry, they sow their crops on the moist land. The chief crops are jooaree and moth. There is no sugar raised in this country. Their wheat and barley is but little, and for the most part irrigated. Cotton is raised to a considerable extent.

There are large spaces uncultivated, though it is certain that cultivation by wells would succeed in most of them. The villages are small and defenceless. The houses in general are thatched, and as unsubstantial and cheap as in any part of India. In some quarters those who attend the live stock in their pasturage, shelter themselves under mats. In the winter come down Bulochees from the west to pasture their sheep. It is difficult to tell what is the chief stock of this country. The natives live on vegetable food. There is little wood either wild or cultivated, the best supply is from the babool tree. The chief fuel is guz.

Shal and Mustoong.

227. These places are about a day's journey distance, and they are commonly coupled together in conversation. Kirta is about eighteen miles west of Dhadur, and has little cultivation. It is the last place in Seeweestan, and from it they reckon thirty-four coss, or fifty miles, to the town of Shal, the intermediate space being uncultivated, and even but little visited by the shepherds. Part of it is the high and cold plain called Dushti-be-daulat, which is a long day's journey broad, and has no water. The temperature of Shal and Mustoong is little warmer than that of Kilat. The only crop is the rubee, which is irrigated from one or more streams. The people generally live in houses, which are flat-roofed. Timber is to be had for their small consumption, and fuel is cheap. The natives subsist by agriculture. They are but few in number. Shal may have 1000 houses, and Mustoong is larger. All the other villages may be equal to Shal. These places are under Mahommud Khan of Kilat, and are in Bulochistan. This country, generally speaking, is included in the ancient geographical division of Khoorasan, but in the present times Bulochistan and Khoorasan are often contra-distinguished. With Shal and Mustoong begin new manners and practices in domestic economy, for here the people make that hard species of cord, known by the name of Kooroot, and which is not made in Seeweestan by the people of Indian race, who are the most numerous of those who dwell there.

Report of the Coal Committee.

In submitting a summary of what has been done since our last Report, we shall commence with the

Tenasserim Provinces.

The annexed map will show at how many points coal has been found in the Tenasserim provinces, and at what points it is likely to prove of most utility. Coal has been found by Dr. Helfer at A, and B, two situations above the falls of the Great Tenasserim, at a distance of eight and nine days' journey, respectively, from the town of that name, but the quality is inferior, and the situation quite beyond the reach of any mode of conveyance to the coast.

Although the quality is excellent in a third situation in which the mineral has been found by Dr. Helfer at C, yet its distance from the coast is such as to render it of very doubtful utility on the Bengal side of the peninsula, whatever benefit it may eventually prove on the Gulph of Siam, as it seems to be situated beyond the boundary range of hills. Fortunately a still more recent discovery by a native, places us in possession of what would seem to be a most excellent coal, close to the banks of the Great Tenasserim river, and within twenty-nine miles of the town of Tenasserim.

Two reports have been addressed to the Commissioner of the Tenasserim provinces on the last mentioned coal, one by Lieut. Hutchinson, dated 6th May 1839; and the other, of a somewhat later date, by Dr. Helfer. From Lieut. Hutchinson's report, we learn that the position of this coal is 12° 21′ 30″ N. lat., and about 99° 5′ E. long., or, by the course of the river, twenty-nine miles from the town of Tenasserim, and sixty-five from Mergui, although its direct distance from the coast is only twenty-eight miles. The coal is said by Lieut. Hutchinson to form a thick bed, covered by three feet of "*clay slate*," and from twenty to forty feet of *sand, which is so tenacious* as to require no propping where springs do not exist. In a subsequent correspondence on this subject, the coal is described as within ten feet of the surface, and from all we can learn, we have no doubt it might be worked like crop-coal, and clay ironstone, as described by Mr. Farey, i. e., merely by sinking pits down to the coal and raising it at once, and after undermining on all sides as much as can be done safely by the use of props, the latter may be withdrawn, and the roof allowed to fall in.

This coal burns with a bright flame, and answers admirably for

steam purposes. 50 pounds tried in the still furnace laboratory of the Honorable Company's Dispensary, afforded four gallons of distilled water, and left a residue of four pounds weight of ashes, cinders, and small coal that fell through the bars of the furnace during combustion.

Its specific gravity is 1.27

Composition,

Water,.	9
Volatile matter,	46
Carbon,	40
Ash,.	5
	100

The distance of this coal in a direct line from the coast being only twenty-eight miles, Lieut. Hutchinson proposed to construct a road, which he supposed would reduce the expense of delivery on the coast considerably. Boats of large draught it is said, may ascend the Tenasserim river at all seasons to Tenasserim town, within twenty-nine miles of the coal, and during the rainy season to the coal itself, so that nothing could be more favourable than the position of this coal for all purposes of local improvement, as well as for steam navigation to the eastward. Forty tons of this coal cost $5\frac{1}{2}$ annas per maund at Mergui, and 8 annas per maund in Calcutta. The Government have called upon Mr. Blundell, the Commissioner of the Tenasserim provinces, to provide 50,000 maunds; and have furnished a working party, consisting of persons accustomed to mining, for the purpose, and have intrusted the superintendence of the necessary operations to Lieutenant Hutchinson.

We have been informed by Captain Lloyd, I.N., that about one degree lower down the coast, coal has been found of very good quality on the *Senhea* river, but the Committee have no information on this head, although some progress had been made in raising a quantity, when the work was discontinued in consequence probably of the more favourable position of the coal near Tenasserim. The Senhea coal is situated, Capt. Lloyd thinks, about 11° 22′ N. lat., and 99° 8′ E. long. about forty miles up the river, the navigation of which is doubtful. It is however the most southern point at which coal has been hitherto found on the Malay coast.

A detached fragment of an inferior coal called Anthracite by some, has been found near Maulmain, latitude 16° 30′ N. thus indicating the presence of coal formations between the Tenasserim coal fields, 12° N. latitude, and Arracan 19° N. latitude, and holding out strong inducements to further search being instituted in that quarter.

Arracan.

The more we know of coal, the more are we impressed with the fact, that it never presents false indications of its presence. There is hardly an instance either in India or elsewhere of its appearing at all, that it does not do so under circumstances to render it in the highest degree important to Society; and although at first the quality and extent of the beds in any new district may be for a time doubtful, yet experience teaches us, that where these indications do not improve in proportion to the intelligence and enterprise directed to their complete development, the mineral is not true coal, but a substance, the peculiarity of which is easily detected, as the brown coal of English geologists. The samples of coal we received from different parts of the Arracan coast, were such as to leave no question whatever as to the beds from which they were taken belonging to the true coal formation.

Coal has been found composing a part of Oogadong, a small island opposite to the harbour of Kyak Phyo, in two situations not very far from each other. The sample supplied was much impregnated with pyrites, it was however a caking coal, belonging to the true coal measures. It would be a desirable object to try how far the Oogadong coal might answer for the reduction of Rambree iron ore, which is very abundant. Red Hill being said to be composed entirely of an ore that was formerly worked to some extent by the Burmese, a small quantity of the ore and coal might be sent to Calcutta for trial, and if the result proved satisfactory, trials on a larger scale might be repeated on the spot, where experiments of the kind must always be cheaper and more satisfactory than when made at a distance. Coal has also been found on Paget, or Adam's Island, south of the great island of Rambree. It has also been found in small seams in one of the Bolonga Islands, as well as near the beach at Sandoway; but the necessary information is wanting to enable us to conclude any thing from these indications, beyond the fact of the existence of coal, to a great extent, in the Arracan provinces.

The most promising bed yet found, is one that was brought to the notice of the Commissioner, Captain Bogle, by Lieut. Lumsden, who states that it was found about two years ago by persons employed in coal-finding by Captain Williams. This coal occurs at a place called Hoong, near the head of a river, which descends from a range of hills on the southern extremity of the island, falling into the Sandoway channel. Mr. Lumsden states that large boats may approach to the very spot where the coal is found. On visiting the spot, Mr. Lumsden

found " an irregular vein of coal, of about a foot in thickness, mixed with broken red sandstone, and on working below it, he came to a kind of *clay slate* and eventually to water." Mr. Lumsden, however, states that he was obliged from fatigue to leave the work to a native, who in a few days brought to him 120 maunds of coal—a larger quantity than we should have supposed a native could procure in so short a time, under circumstances described by Mr. Lumsden. A sample of this coal, consisting of four or five maunds, was brought to Calcutta by Captain Bogle, and tried in the Laboratory of the Honorable Company's Dispensary, and found to burn with a clear bright flame and very little smoke. The following are the results of its analysis :—

Specific gravity, ...		1.28
Inflammable matter, ...	40	
Carbon, ...	54	
Ferruginous ash, ...	6	
	100	

It is a free burning coal, giving out a strong heat, and would no doubt be found suitable to steam purposes, as it is quite free from the sulphureous impregnation which rendered the former samples of Arracan coal objectionable.

The want of more satisfactory information than we yet possess regarding Arracan coal is much to be regretted, as there is no part of India in which good coal mines could be attended with more advantage, whether we regard the situation on the coast, or the peculiar circumstances of the province itself. This district is chiefly known to Europeans by the mortality that took place there during the late war. Few are aware that within twenty miles of the town of Arracan, there is a fine elevated chain of mountains, extending parallel to the coast, and affording no doubt as fine a climate as any part of the world, although the coast itself is low, and like many similar tracts in the north of Italy, and south of Europe, unhealthy. Let good coal be once discovered in abundance in this fertile province, and the deadly effect of climate to persons exposed in miserable boats, or damp huts surrounded by swamps, will disappear, and the indolent streams become the track of steamers, perhaps to the very foot of the hills, which might thus become available as places of residence.

Sylhet.

Although the attention of the Coal Committee has been constantly directed to this quarter, the only result accomplished since the

last report, that can be said to be new, is the delivery of 10,000 maunds of Cherra coal at Goalparah, in Assam, at the rate of eight anas per maund,* after the attempt to supply that station during the rainy season with coal at any price from Burdwan had failed.

Three beds of coal, situated near the foot of the hills, have been brought to notice, but we have no information on the subject to enable us to decide whether these are new discoveries, or merely the bed alluded to in our last reports, as having been brought to notice some twenty-five years ago by Messrs. Jones and Stark. Without going into that question, we shall merely state all we know of the three beds now alluded to.

The first and most promising, is that of Byrung Poonjie,† situated near a village of that name, within about two miles of water carriage, and the ground such as to allow of the construction of a hackery road.

We know nothing of the circumstances of the bed, further than is stated by Mr. Landers, a practical gentleman, who has been appointed for the superintendence of coal mines in Sylhet and Assam, and who observes—

" Byrung coal is of a soft quality, intermixed with stones three feet and a half high and varying in its thickness. The vein runs from east to west, and descends with the hill towards the south : to what extent this field may exist, it is impossible at present to say, the want of proper implements" (these have been since provided) " prevented me from ascertaining ; a trial ought to be made by running galleries into the strata six or eight fathoms, at once to determine both height and quality, and also if it would admit of any outlay." This coal has been tried, and appears to be likely to answer very well for steam, while it has the additional advantage of yielding excellent coke.

Not far distant from the Byrung bed, there is another at a place called Chiela, or Chaila, which varies from one to three feet in thickness. This however is said to be an inferior coal.

Major Lister, to whom we are indebted for the first and almost the only information we have had regarding the two foregoing coals, states, that Mr. Inglis, of Cuttack, has found a coal bed above Chaila, at a village called Mustuk, about 1,500 or 2,000 feet above the plains,

* This having been done under the direction of the Marine Board, the Committee have documents on the subject.

† Communication has heen received from Major Lister since the annexed remarks were written, stating that Mr. Landers has traced the Byrung Poonjie bed for two miles to the westward without finding more on an average than a foot of good coal ; hence Major Lister and Mr. Landers conclude the Byrung bed is not workable.

and within such distance of water carriage as to enable a porter to deliver five burdens daily from the pit into boats. Mr. Inglis is of opinion that this coal is quite as good as that of Cherra,* and Major Lister observes that it looks so, though the quality is different, being blacker, with an exceedingly high polish ; it burns considerably longer than Cherra coal, and cakes less, but is heavier, and yields more ashes.

The value of these, as well as similar indications alluded to in our last report, is still doubtful, and must remain so until the whole tract along the base of the Kasyah hills be submitted to a geological survey. For the present season, if the Government require coal from this quarter, we agree with Major Lister in thinking it will be necessary to confine our exertions exclusively to the Cherra bed. This, as is well known, is situated on the summit of a mountain, nearly 5,000 feet above the sea, and at such a distance from navigable rivers as to render it a day's work for each cooly to deliver a maund, or about 80 pounds, of coal from the pit into a boat.

The only way of lessening this inconvenience would be by improving the conveyance, by an improvement of the road. Above and below the steepest portion of the descent would admit of bullocks being used, as stated p. 48 in our former report. Instead of porters for the steeper or middle portion of the journey, it has been proposed to construct a slide, as suggested by the late Colonel Watson. The improvement of the road between Cherra and the plains would be a work of some public utility, as it would be the means of facilitating ingress and egress to and from the mountain platèau, it would therefore be a very desirable object, independent of the coal. The value of a slide however, would depend entirely on our success in finding as good a coal below, as that which is above—an uncertainty which ought to be at once removed by a perfect geological survey, as already suggested.

Some difference of opinion prevails as to the best way of transmitting Sylhet coal to the great lines of inland navigation on the Ganges ; some contending that it would be necessary in the first instance to send them a distance of 300 miles to Calcutta, and from thence back to Surda, and other depôts on the Ganges ;—experience is the only way of settling questions of this nature, and measures are now in progress for the delivery of the largest possible quantity—10 or 15,000 maunds of Cherra Poonji coal—in Calcutta, with the least

* A cargo of it having recently arrived in Calcutta it is now (4th May, 1840) under trial on a large scale, and promises to turn out very favourably.

possible delay, compatible with the fair trial of the experiment. The Kasyahs, on whom the burden of the experiment will literally fall, though a fine athletic race, are little accustomed to labour; Major Lister may therefore have some difficulty at first in reconciling a sufficient number of them to a continued effort, the object and importance of which, they can so little understand.

It is necessary to take the quality of coal into account before any particular price per maund can be regarded as dear or cheap; it is quite incredible to what degree a slight difference in quality affects the value of coal, for steam vessels. It has been found by means of the only trial instituted between Cherra and other coals now in use, that 9 maunds are equal to 14 of Burdwan coal. Let us suppose (without laying too much stress on a single trial of a few maunds) the proportionate value of the two coals to be ascertained as above; 100 maunds of Cherra would not only as a fuel be equal to 155.5 of Burdwan, but we should also have to debit to the latter the value of 55.5 maunds stowage or tonnage, which might amount to more than the entire value of the coal consumed.

The Cherra Poonji coal forms the cap of a hill, from which each cooly may help himself to his load almost without the aid of mining, so that the carriage, 4 annas per maund from the pit to the nearest navigable river, though high, may be said to include the expense of winning, or bringing coal to the surface. Could any of the following indications of coal lower down, towards the foot of the mountain, be found to yield good supplies, a portion, or nearly the whole of this large item of expense might be saved, viz. 1. Tipperah hills, in a small river which descends from a hill with a Musulman Doorga called Orpeen, on its summit; 2. Opposite to Jalalgur, in Lowr; 3. Patli river, and several streams descending from the Garrow mountains; 4. Near Susung; 5. On the top of one of the lower ranges at Lowr, and in the rivers of Lowr; 6. In the Dysung and its tributaries; 7. Between Pannalik and Bansekora; 8. Barachara; (vide reports of the Coal Committee, pp. 49, 50, 51) to which we have now added Byrung Poonjie, Chaila, and Mustuk, (vide para. 13, 14, and 15, of the present report.)

The rate of boat-hire from the Sylhet district, along the verge of which the coal formation lies, to Surdah on the Ganges, one of the principal depôts for the supply of steamers, is stated by Mr. H. Inglis to be 21 rupees per 100 maunds. In regard to water conveyance, Sylhet has the advantage of any of the coal districts to the westward, while its proximity to the great rivers of Bengal gives it an advantage over the Assam coal districts; and thus while

any mines that might be established in Sylhet would hardly be affected in value by similar establishments in any other part of India, there is hardly a district from Arracan to Palamow the value of whose mines would not seriously be affected by any subsequent discovery of coal in Sylhet. In like manner any collieries that might be established in Assam, or other remote provinces, would be entirely superseded in the Bengal market by any new discoveries of good beds of coal that might be made in the Sylhet district. It is for this reason that we have laid peculiar stress on the importance of a thorough investigation of the coal measures along the base of the Kasyah and Garrow hills, since upon this, and the manner in which it is conducted, must depend in some measure the prudence of investing capital in more distant coal districts.

Surdah is within a few miles of Bogwangola, one of the greatest marts in Bengal for grains of every kind, goor, oil, ghee, and the chief articles of native consumption. Being situated in the centre of Bengal, near the junction of all the principal rivers, as the Bhaugarutty, the Ganges, and Bramputra, it is naturally the centre of internal commerce, and consequently the greatest mart for boats in Bengal. Surdah, or some situation in that neighbourhood, appears therefore to be the situation at which a General Depôt ought to be formed. We have consulted J. W. Grant, Esq. of the Civil Service, who had been long commercial resident at Maldah, and Major Carter, who has been for a large portion of his life in the Bengal Commissariat, and the experience of both these gentlemen goes to prove that at Bogwangola and Jellinghee, boats for the transmission of coal from Surdah to any part of Bengal or the Upper Provinces may be had to any amount of tonnage likely to be required.

The distance from Cherra Poonji to Calcutta by water, is about the same as to Surdah; while the latter is one hundred and fifty miles nearer to Rajmehal, and other depôts to the eastward.

Major Carter states that the voyage from Calcutta to Cuttack in an empty boat should not take above 24 days, and returning laden, about the same period, as the stream would be favourable to Dacca, and from thence in the tide way. "Assuming however, two months as the time necessary to complete a voyage, including loading and unloading, it strikes me," says Major Carter, "$2\frac{1}{2}$ annas per maund should nearly cover the carriage, and below I give the

grounds of my opinion. A thousand maund boat can be hired at per

Mensem	30	0	0
" 10 Dandies at 3 Rupees each,...	30	0	0
" 1 Manji at 4 Rupees, ...	4	0	0
	64	0	0
			2
	128	0	0

This boat should carry 800 maunds, which just gives 2 annas 6½ pice per maund, so that at this rate Cherra coal ought to be delivered in Calcutta at 7 annas per maund; Major Carter therefore expresses his surprise that an offer recently made by the Marine Board, of 9 annas for Cherra coal, had not been taken up, and suggests that if boats of 2 or 3000 maunds, such as are used for bringing wood from the Sunderbunds, were employed as far as the rivers would admit, the carriage would be still lower.

The readiness with which boats may be had for any regular trade, may be imagined by the following observation of Major Carter :— " Hundreds of large boats frequent the Sunderbunds, nearly as far as Dacca, in search of cargoes of rice and dhan, the worth very little more in ordinary years than coal, and the latter scarcely one half as valuable; they do not find their cargoes at one place, or belonging to one person, but attend the banks, and purchase in whatever quantities the people bring to the market, often only a few seers, and seldom exceeding a few maunds."

The Commissariat regulations, and general custom of paying boat-hire on a computed distance instead of the time actually employed, might in the first instance militate against the economy of any arrangement for hiring boats, says Major Carter; but if a few boats were purchased or built at Dacca or in the Sunderbunds, and manned by a private individual, the result would prove the correctness of these calculations. A good boat could be built for 500 rupees, and in six trips, at the above rate, would yield 300 rupees, leaving 60 for casual repairs, this would repay itself in less than two years; but a boat is expected to last seven or eight.

Cuttack.

About ten years ago a specimen of coal found in the Cuttack district was sent to the Asiatic Society, probably with some particulars which do not appear to have been noted in the proceedings; the circumstance was however suggested to the Committee by Captain Jenkins, in 1837, and soon after Lieut. Kittoe, then with his regi-

ment at Cuttack, obtained a specimen, together with some particulars which he communicated to the Committee; on which he was requested to visit the spot, when he collected the following particulars. Half a mile from the Fort of *Talcheer** coal seams are exposed along the banks of a small *Nulla* called *Belajooree* (at a spot where workmen employed by Mr. G. Becher, had a few years before extracted some specimens of coal). Mr. Kittoe formed an excavation to the depth of 15 feet, in which he found at a depth of 13 feet a bed of "good glistening coal," 1 foot to 1½ foot thick, reposing beneath ten feet of "*shingle*" and two beds of shale and blue clay, each 1½ foot thick. The latter, as well as a grey rock beneath the coal, both containing fossil plants.

Mr. Kittoe states, that a native contractor offered, in the event of coal being raised at Talcheer, to convey it down the Bramenee river to *Himsuagola*, on the coast, where large sloops may anchor, at four annas per maund; but Mr. Beetson, the contractor for the transport of salt from thence to Calcutta, was of opinion, that two annas per maund at the utmost would be sufficient. From the coast to Calcutta the transport of coal would be the same as that of salt.†

The next coal to which Mr. Kittoe by his guide was conducted, is a few miles higher up the Bramenee, and at a distance of sixteen or eighteen miles from that stream, so that its conveyance would be considerably more expensive. The coal is here exposed for a mile on either side of a nulla called *Sungurra*, a tributary of the Bramenee, averaging in height from five to fifteen feet above the sand. The country is said to be level from the coal to the bank of the Bramenee, so as to afford every facility for the construction of either a road or a canal. Iron ore is found in great abundance throughout both these coal districts, and the ore is smelted to some extent, and by the same process as that which prevails in other parts of India.

Such is the substance of Mr. Kittoe's Report.‡ The specimens of coal furnished were not of good quality. Three specimens of Talcheer coal examined at the Mint, afforded the following average results:—

Specific gravity, ...	1.3610	
Volatile matter,..	39	0
Carbon, ...	44	1
Earthy matter,..	15	10
	100	0

* Talcheer is a town on the Bramenee river, 140 miles from the coast.

† At present there are three contracts for the conveyance of salt from Hunsew to Calcutta; the rates are 18 Rs., 17 Rs. 8 annas, and 17 Rs. per 100 maunds.

‡ Vide Asiatic Journal of 1839, pp. 137—141.

Talcheer and Hingolar may be regarded, we think, without much doubt, as an extensive and valuable coal field. The workable beds will probably be found to be some distance from the surface at the spots visited by Mr. Kittoe, but the district appears to have been subject to so much local disturbance, that more favorable positions for coal mines may be expected, when the country has been properly examined.

Since the above remarks were written, the Committee have received a communication from Mr. Mills, the Commissioner of Cuttack, enclosing a report from Mr. Beetson, whom he deputed on 22nd February last, at the instigation of Mr. Smith, the President of the Coal Committee, in order to procure further information on the subject. Mr. Beetson reports, that "the samples laid before the Committee by Lieut. Kittoe, were far inferior to those I have now brought with me. The latter are equal to the best Burdwan; but to satisfy the Committee as to its description and quality, if Government will pay the expenses, which will amouut to a mere trifle, I shall be happy to undertake the delivery of one or two hundred maunds in Calcutta by next December." Mr. Mills observes that the specimens, as far as he and other gentlemen at the station are able to judge, are so very good, that he authorized Mr. Beetson to procure 100 maunds for trial in Calcutta. This coal is derived from the second, or more distant coal field visited by Mr. Kittoe. The locality in which the coal occurs is, according to Mr. Beetson, called *Gopal Pushad,* and the nulla by which it is laid bare, *Sangra,* which corresponds with Mr. Kittoe's name *Sungurra.* Mr. Beetson states, that the distance from Gopal Pushad to Talcheergur is from fourteen to sixteen miles, and recommends that the coal be carted by buffaloes (the common draught cattle of the country) to Talcheergur. From Talcheer the coal could then be conveyed in ten or twelve maund boats to Kumalung, six miles below Talcheergur, where it should remain till the setting in of the rains, and from thence it may be conveyed for six months of the year in from 100 to 300 maund boats to Hunsuah on the coast, where it would be available for sea-going steamers at from three to four annas per maund. From Hunsuah, Mr. Beetson would undertake to convey the coal to Calcutta at 18 Rupees per 100 maunds, and indeed he thinks he could supply it to the Calcutta market at six annas per maund, including every expense.

Adji.

Since our last report, little has been elicited regarding the northern boundary of the Burdwan coal field, where the beds advance

towards the Adji river. Mr. Erskine in reply to a circular from the the Committee, dated October, 1838, recapitulates the different places at which coal has been found. Mammudpore is the most eastern situation. The pits are here four or five miles from Seedporeghat. The mineral is better to the westward at Parihorpore, about ten or twelve miles above Seedpore. Seedpore is eighteen miles from Cutwa or Culna on the Hooghly, and the river is pretty open during the rains for boats of 400 maunds burden from Maulyghat to Cutwa, a distance of forty miles. The upper portion of the river rises and falls suddenly, so as to render it difficult to manage a larger boat than 200 maunds. Mr. Erskine observes, that considering the difficulty of the Adji navigation, and the scarcity of boats at present, and also the high price that it would be necessary to offer to boatmen to induce them at first to undertake the carriage of coals; he does not think the coal could be delivered at Cutwa under four annas per maund. Should the regularity of the employment induce people to build more boats (as has been the case on the Damooda,) prices might fall to about 3 annas per maund. Adji coals are now used for the Dhoba Sugar Works to the extent of 10 or 15,000 maunds per annum.

Rajmahal.

When our last report were written, coal was known to exist in two situations only in the Rajmahal hills; namely, Sicrigully and Hurrah. In April 1838, Major Forbes was informed by Mr. James Pontet that he had found a bed of coal in the Rajmahal hills, on the banks of a nulla called the Bramenee, sixteen miles distant from the water carriage during the rains, about thirty miles west of Moorshedabad, and nearly in the line of the canal proposed by Major Forbes. A specimen of this coal afforded the following on analysis:—

Specific gravity, ...	1.370
Volatile matter, ...	42 0
Carbon, ...	44 8
Earthy matter, ...	13 2
	100

A sample consisting of a few maunds furnished by Mr. Pontet sometime before to Mr. Scott, the commander of the Jumna steam vessel, also proved of favourable quality. Mr. Pontet having been desirous of procuring the means of extending his observation, these were provided, and on the 20th June he dispatched ten bags of coal to Calcutta, this also proved favorable; but a subsequent dispatch of 400 maunds consisted of shale and inferior coal. In explanation

of this last unfortunate circumstance, Mr. Pontet stated that the necessary aid did not reach him till the rains had set in, when the place being unhealthy, he was obliged to leave the raising and dispatch of the coal to inexperienced natives.

The following is an extract from Mr. Pontet's letter, in which he describes the operations in which he was engaged—" After the first vein of coal, we came upon a hard black stone, and finding the operation of boring through it so very tedious, I took upon myself to select a spot for a shaft, and procured well-diggers, and stone-cutters, who have been for the last two months at work, at present to all appearance with satisfactory prospects, as one of the stone-cutters who opened a shaft at Burdwan says this mine bears some resemblance to it. I am induced to persevere a few feet more, in hopes of coming to a useful vein. The first twenty-three feet of soil is red and black earth mixed with kunkur, and under that, to a depth of forty feet, are thirteen different *strata*, three of coal, and the rest various kinds of stone." Mr. Pontet transmitted to the Committee specimens of all the different beds passed through, which are remarkably characteristic of the true coal measures; and of eleven different beds passed through in the last seventeen feet of the excavation, three were coal of good quality, but too thin for working, and in the shale we observed excellent specimens of *Vertabrea Indica*, one of the few abundant fossils of the Burdwan beds that happens to have received a name.

The excavation was formed on the N.W. side of the Bramenee nulla; but Mr. Pontet states that he traced the coal a mile S.W. of the Bramenee river, from which he concludes that the Burdwan and Rajmahal beds are connected.

Soan River.

In a letter from Mr. Ravenshaw, Officiating Commissioner of Patna, to the Government of Bengal dated 6th January last, that gentleman states that a Cazee had found a bed of coal at a place called Chupree, four miles from the Soan, near its junction with the Koila, and estimated the expense of delivering coal from this bed to Dinapore to be five and a half annas per maund. On this information 300 rupees were advanced to the Cazee to enable him to commence operations; but after extracting 100 maunds, precisely similar to Palamow coal, the bed assumed a slaty character, and the Cazee abandoned his operations. If the Cazee's statement regarding the existence of coal so near the Soan be correct, the circumstances under which it occurs ought to be fully investigated.

Palamow.

Mr. Tytler, an engineer employed under the Controller of Steamers, having been deputed, under the authority of the Marine Board, to Palamow, describes a bed of coal six feet thick, exposed to a great extent on the banks of the Amanath river, where Mr. Homfray a short time before could only find a $3\frac{1}{2}$ feet bed, so interrupted by ravines as to render the field very limited. There is however evidence enough in the reports of Major Sage, and Mr. Tytler, as well as in the information furnished to Mr. Ravenshaw, the Commissioner of Patna, to show that coal is here abundant enough, the only doubt is as to its quality. The samples of Palamow coal that we have seen have been vitiated by the inexperience of the miners with an intermixture of shale, so as to render them unfit for trial. Major Sage, Executive Engineer, Dinapore, states that he had formerly been in the habit of receiving supplies of coal from Palamow, which he considered a good and useful fuel. We have no doubt that a good coal may be procurable in Palamow, but such samples as have been hitherto sent to Calcutta for trial have been inferior, partly no doubt from their having been ill chosen from the numerous beds that seem to occur in that district. Major Sage found the following results from comparative experiments instituted between Palamow and Burdwan coal, from which it would appear that the former has the advantage in point of quality.

	Palamow.	*Burdwan.*
Coke, ...	46 2	46 2
Volatile matter, ...	47 0	40 0
Earthy matter, ..	6 8	13 8
	100 0	100 0

In experiments of this kind on a small scale, every thing depends on the specimens selected for comparison. The Burdwan coal varies in quality in different mines, just as Palamow coal would vary if mines were once fairly established in that district.

The best Burdwan coal we can induce the contractor who supplies the laboratory of the Honorable Company's Dispensary to furnish, affords 25 per cent. of ashes, but the kind used on board steamers is said to be very superior to this, and the Ranygunge variety with which other coals are compared, is the best in Burdwan. Much judgment is therefore necessary in selecting samples for trial from new coal districts, when the object is to compare them with Burdwan coal. What-

ever coal it has been customary to use will always have the advantage of a new coal in such trials, in as much as the form of the furnace, and the manner of keeping up the supply will be such as are suited to the old coal, while the necessary experience is wanting with regard to the most favourable circumstances for burning the new.

If the draught of the furnace be too great for the coal, the fire will burn down too rapidly, and the coal will be wasted in an unnecessary quantity; and if not sufficient, the fire will burn too slowly, and the stoaker perhaps accustomed to throw in fresh fuel at certain intervals will keep the fire choked, so as to require more frequent stoaking than necessary, and (as Colonel Presgrave remarked on the late trial of Palamow coal) every time the door is opened for this purpose, a volume of cold air enters, the effect of which is to lower the steam.

On board the Jumna steamer, 13th March last, three samples of Palamow coal were tried, one furnished to Mr. Ravenshaw by Cazee Mohumdee, mixed however with Chupree coal, and the other two from Mr. Tytler; the first seemed to answer best, though evidently raised without judgment, and mixed with shale. The faults of this compared with the best Burdwan coal were, that it required a much larger quantity to keep up steam, and that it ran into slags or clinkers, which choked the bars of the furnace. This last effect may have been owing to the coal being mixed,* and perhaps would not have taken place had the bars of the furnace been wider apart. Mr. Tytler's sample from Lower Miral appeared to burn very freely, but compared with the best Burdwan coal, twice the quantity was required to keep up steam. On a third sample from Upper Miral being tried, it was found that even with an excessive consumption of the fuel, it could not keep the engine at full work. The value of these experiments will however depend on two circumstances, namely, whether the samples tried were the best that could be chosen, and whether the furnaces of the Jumna are as well suited to the nature of the coal as any that could be constructed.

Mr. Ravenshaw thinks he can procure a contract for the supply of Palamow coal at Dinapore for six annas per maund, it would therefore be of some importance to have the question of its quality fairly set at rest.

* A small quantity of carbonate of lime or soda would have the effect of rendering the earthy parts of coal fusible. We think in another trial of Mr. Ravenshaw's mixed coal we could easily select the pieces which formed slags from the general mass, as they are covered on the surface with an efflorescence of soda. We think they belong to Singra, one of the Palamow beds, and the peculiarity is probably very local.

Assam.

A report having been furnished on the subject of the Assam coal beds since the last general reports of the Committee were written,* there is little to say on the subject. Lieutenant Brodie, principal assistant to the Commissioner, found coal of good quality about a year ago in a very favourable position on the Disung river, a specimen of which was forwarded to the Committee in July last, and found to afford—

Specific gravity, ...		1.3
Inflammable matter, ...	40	
Carbon, ...	55	
Earthy matter, ...	5	
	100	

We believe the Assam Tea Company are already about to open a colliery in this situation, with the intention of keeping a depôt supplied from it at Dikoo Mookh, on the main river.

Mr. Brodie had before found two and a half feet bed of coal about three and a quarter of a mile above the falls of the Jumna. A boat on average would reach the falls from Gowahattee in twenty days, and return in ten. Some years ago coal was raised by Mr. Bruce, under orders of the late Mr. Scott, from beds near the banks of the *Suffry*, a tributary of the Disung; on trial *this proved to be the best coal ever found in India,* but the situation was inconvenient, the Suffry being unnavigable at all seasons, and a small ridge of hills would render the formation of a hackery road difficult. In February 1838, Captain Jenkins found two beds of coal, one of them 100 yards in length, and eight feet in thickness, projecting from the banks of the Disung river about a mile above the village of Boorhath; the other situated in rising ground, about a quarter of a mile from the first, was exposed for 200 yards in length, and numerous small springs of petroleum emerged from beneath it. From these Captain Jenkins' servants collected about five seers of petroleum in a few minutes. The Disung is navigable for six months of the year.

Beds of coal were also observed by Captain Jenkins at Jeypoor, about ten miles east of Boorhath, on the Bora Dihing river, a quantity of which was raised by Captain Hannay and sent to Calcutta, but not approved of. Like all similar experiments on the quality of coal the results proved little, especially as we now understand the Assam

* Published in Journal As. Soc. 1838, pp. 948, 959.

Tea Company have established a colliery in this situation,* in addition to the one already alluded to on the Disung; thus two principal depôts will be supplied on the main river at Debru and Dikoo, from distinct coal districts capable, if necessary, of supplying other depôts along the whole line of the Bramaputra.

An excellent coal was found by Lieut. Bigg and Mr. Griffith on the Numroop river, in Upper Assam, and Mr. Bigg states that immediately opposite the village on the west of the river is another range of hills similar to those in which the coal is found; in these they found eight or ten springs of petroleum.

Nerbudda.

With regard to the Nerbudda coal, the Committee have received no communications since their last reports were laid before Government, but it appears to have been since tried at Bombay, and found to be of very excellent quality.

Specimens of coal were found by Captain Burnes during his mission to Cabul in 1838, in the following districts, viz., 1, Shukurdura, near Kala Bagh, where it occurs in a hill two miles south of the village, and other situations in the neighbourhood; distance from the Indus about 15 miles. 2, near Muckud, locality doubtful. 3, fifteen miles SSE. of Cabul near Moozye, in the vicinity of copper mines. 4, Jamoo, in the Punjab, near the Chenab, where it would be as valuable as if found on the Indus. 5, between Tak on Kaneegoorum, NW. of Dera Imael Khan, 1½ coss East of the small village of Sungarkhyle, in the neighbourhood of the Indus, where the country is said to be poor, and labour cheap. Captain Wade, Political Agent at Lodiana, also found specimens of coal in the Maundi Hills north of the Sutlej: more recently we believe Mr. W. Jameson, whose observations will be of peculiar value in every point of view, has found extensive tracts belonging to the coal formation, approaching as near to the Indus as he had been able at the time he wrote to carry his inquiries.

(Signed) J. M'CLELLAND,

4th April, 1840. *Assistant Surgeon,*

Secretary Coal Committee.

* As well another at the place.

Shewing the Situation of the Coals found in the Tenasserim Provinces.

Proceedings of the Asiatic Society.

(Wednesday Evening, 6th May, 1840.)

The Honorable Sir E. Ryan President, in the chair.

Read the Proceedings of the last Meeting.

The President read the following letter addressed to him by Dr. O'Shaughnessy, stating that in consequence of the pressure of other business, he was reluctantly obliged to resign the office of Officiating Secretary to the Institution, and at the same time informed the meeting that Mr. Sutherland who undertook to co-operate as Joint-Secretary in the Oriental department during the temporary absence of Mr. J. Prinsep also wished to be relieved. He therefore wished to be relieved.

To the Honorable Sir Edward Ryan,

President of the Asiatic Society of Bengal, &c. &c.

Sir,—I beg you will have the goodness at the next Meeting of the Asiatic Society to submit my respectful request to be relieved from the duties of acting Secretary. My time is so much occupied by engagements which I cannot neglect, that the general business of the Society must fall into confusion if allowed to remain any longer in my charge. Under such circumstances the best proof I can give of my anxiety for the prosperity of the Society, is by retiring from the honorable office they conferred upon me, at a time when there is fortunately no difficulty in finding at the Presidency individuals qualified in every respect to discharge the duties of the appointment.

Any aid I can afford in the Physical Department, and as a *Collaborateur* in the continuance of the Journal, I am most willing to give, so long as the Society may have the least occasion for my humble assistance.

I have the honor to be, Sir,
Your obedient servant,
W. B. O'SHAUGHNESSY.

Calcutta,
6th May, 1840.

Resolved—That the resignations tendered on behalf of Dr. O'Shaughnessy and Mr. J. C. C. Sutherland, of the situations of Joint-Officiating Secretaries of the Asiatic Society, be accepted; and that the offer of Mr. H. Torrens to undertake the duties of Officiating Secretary, during the illness and absence of Mr. James Prinsep, be cordially agreed to.

Resolved—That the thanks of the Society be given to Dr. O'Shaughnessy and Mr. J. C. C. Sutherland for their zealous and able services, and for the assistance they have rendered to the Society in the management of its correspondence, in the conduct of the Journal of the Society, and in the promotion of its scientific and literary objects, during the period of their performance of the duty of Secretaries.

Read the Proceedings of the Committee of Papers, in which is noticed the applications received for the office of Curator. The Committee recommend that Mr. Assistant Surgeon Thompson be selected to officiate in the office.

Resolved—That the recommendation of the Committee be adopted.

Mr. J. G. Grant brought to the notice of the Committee, that he accidentally had been made aware of the existence of printed Catalogues of the Society's Library, and suggested that the Catalogues and Appendices should be circulated amongst the Members as revised and printed. Mr. Grant's suggestion was adopted.

Library.

Read letters from Mr. Secretary Bushby, forwarding the following *books on the part of Government.*—

Notes on the Law of Storms, applying to the Tempests of the Indian and Chinese Seas, drawn up for the use of the expedition to China, by H. Piddington.

Arabian Nights, in Hindustani, vol. 2nd.—*From Government.*

A Manual of the Political Antiquities of Greece, Historically Considered, from the German of Charles Frederick Hermann.—*By the Translator.*

Answer to a Sketch of the Arguments for Christianity and against Hinduism, by Hurrochunder Turkopunchanun, Calcutta, Feb. 1840, in Sanscrit.—*By the Author.*

Lardner's Cabinet Cyclopædia. History of Denmark, Sweden, and Norway.—*Purchased in England.*

Cyclopædia of Anatomy and Physiology, by R. B. Todd, 2nd vol.—*Purchased.*

Literary.

The following Papers were received from Government, for publication in the Society's Journal.

Report on the Country between Tatter, Sehwun and Korachee in Sindh, by Capt. De la Hoste, Assistant Quarter-Master General.

Memoranda respecting the existence of Copper in the Territory of Lus, near Bela, by ditto ditto.

Some Account of a Journey from Korachee to Hinglaj, in the Lus Territory; descriptive of the intermediate country, and of the port of Soumeanee. By Capt. Hart, 2nd Grenadiers (Bombay Army.)

Dr. Irwine on the Application of Machinery to Indian Agriculture.

Read a letter from Capt. J. Jenkins, Governor General's Agent N. W. Frontier, requesting the loan of two or three Tibetan works for the use of his interpreter, Mr. Kellner, to make himself fully versed in the Tibetan language.

The Secretary informed the Meeting that the subject of inquiry was referred to Mr. Csoma de Koros, the Librarian of the Society, who reported that all the Tibetan works belonging to the Society were in general on religious subjects, and of which there were several duplicates.

Resolved—That the subject be referred to the Committee of Papers.

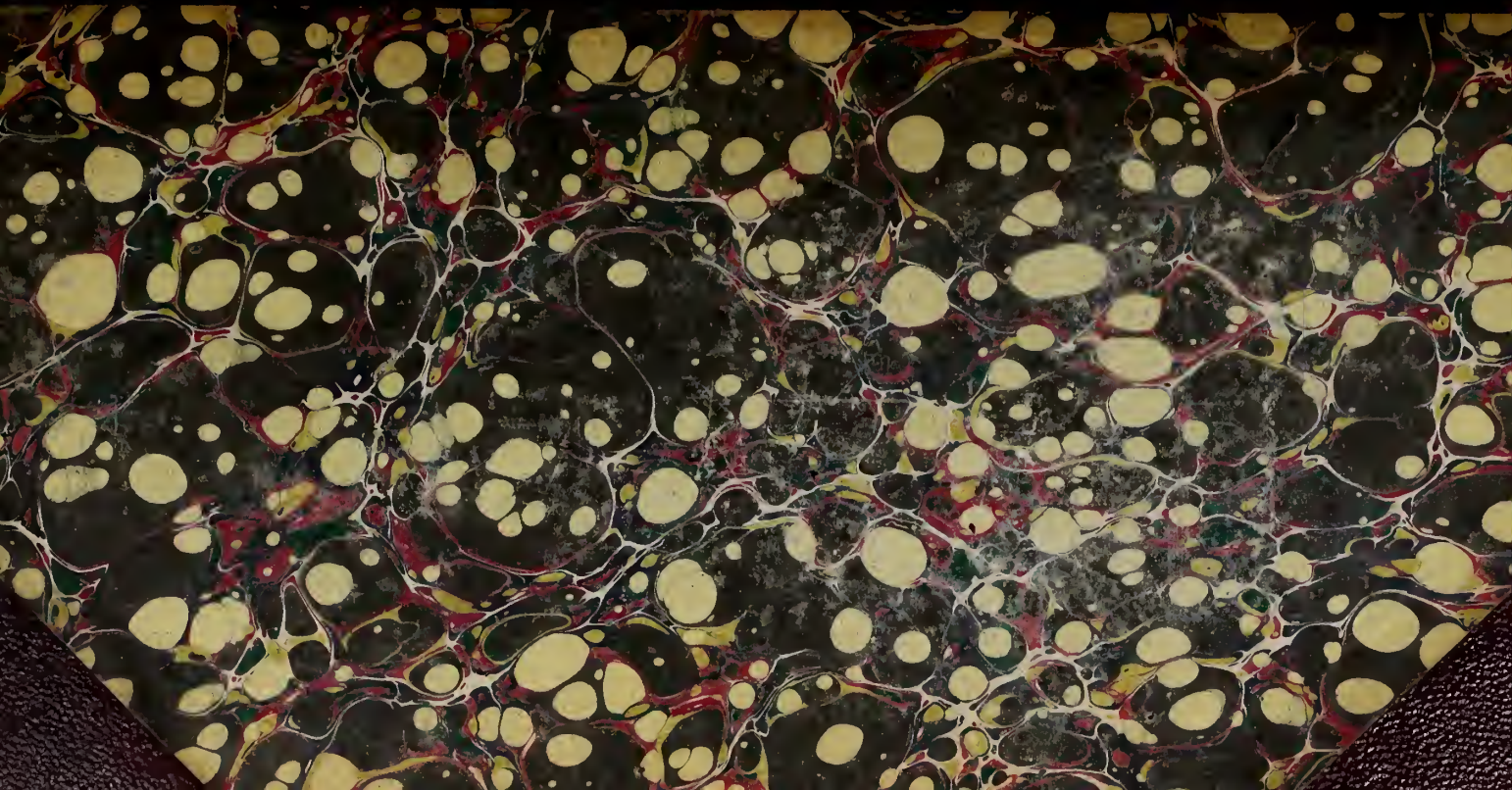
Physical.

Read a letter from Mr. W. B. Turner, Chief Engineer on board the "Seaforth" Ceylon Colonial Government Steamer, forwarding a paper on a new mode of making charcoal.

Resolved—That the Paper be referred to the Coal Committee.

Read a letter from Dr. J. T. Pearson, forwarding a few Geological specimens for transmission to the Museum of the Honorable East India Company.

Meteorological Register, kept at the Surveyor-General's Office, Calcutta, for the Month of May, 1840.

Day of the Month.	Moon's Phases.	Minimum Temperature observed at sun-rise.						Maximum Pressure observed at 9 h. 50 m.						Observations made at apparent Noon.					
		Barometer.	Temperature. Of the Mercury.	Of the Air.	Of an Evapg. Surface.	Wind. Direction.	Aspect of the sky.	Barometer	Temperature. Of the Mercury.	Of the Air.	Of an Evapg. Surface.	Wind. Direction	Aspect of the sky	Barometer	Temperature. Of the Mercury.	Of the Air.	Of an Evapg. Surface.	Wind. Direction.	Aspect of the sky.
1		.....	.....	.....	.....	.....	.....	30,504	81,5	79,2	78,0	E. h S.	Overcast showery	29,461	82,4	84,5	81,5	.....	Gale from the South. Nimbi
2	⊙	29,700	81,9	80,9	79,2	S. ..	Cloudy.	,724	84,9	88,1	83,5	S high	Detached light Clouds	,724	86,4	87,0	83,9	S. ..	Cloudy (showery
3		,748	81,6	80,0	78,0	S. ..	Detached Clouds.	,804	85,0	87,5	83,7	S. ..	Detached light Clouds	,792	85,9	90,6	84,3	S. ..	Detached Cumuli.
4		,684	81,5	80,5	80,0	S. ..	Clear.	,736	85,3	89,7	83,0	S ..	Cumuli and Haze	,720	87,6	91,2	83,9	S. ..	Cumuli, and Light Haze
5		,725	80,0	77,5	76,0	S. ..	Generally Clear.	,762	85,3	88,0	82,0	S. ..	Cloudy.	,760	86,8	90,0	82,2	S. ..	Cloudy.
6		,710	78,0	74,5	73,5	S. ..	Cloudy (Nimbi.)	,713	82,9	86,0	83,0	S ..	Scattered Clouds.	,713	83,6	89,5	83,8	S ..	Cloudy.
7		,709	72,2	77,5	75,5	S. ..	Nimbi interspersed	,760	81,0	80,9	77,5	S. W.	Hazy.	,760	82,0	85,5	80,0	S. ..	Light Clouds
8	)	,722	77,5	78,5	78,8	Calm	Cloudy and foggy	,788	82,5	88,0	83,5	S. W.	Detached Cumuli	,772	81,9	92,2	84,8	S. E.	Cumuli.
9		,790	79,5	79,4	79,0	S. W.	Light Clouds.	,815	83,9	88,0	83,5	S. W.	Cumuli	,842	87,5	92,0	83,2	S. ..	Cumuli
10		,794	81,0	79,0	79,0	S. E.	Generally Clear.	,860	85,5	88,6	83,9	S. W.	Cumuli.	,850	86,8	93,5	84,0	S. W.	Cumuli
11		,810	80,7	76,5	75,0	Calm	Cirro-strati.	,856	83,9	89,0	80,5	S. W.	Light Cirro-strati	,849	86,5	95,8	85,0	W ..	Clear.
12		,794	81,5	80,0	80,0	Calm.	Clear.	,811	85,7	91,5	85,7	N. W.	Cumuli.	,820	86,8	97,5	86,2	S. W.	Cumuli
13		,782	81,8	81,5	80,0	Calm.	Haze.	,832	85,9	89,5	82,5	Calm	Hazy.	,813	88,2	94,8	85,0	S. W.	Haze to the N. Cumuli.
14		,750	82,5	81,3	77,0	S. ..	Clear.	,800	87,6	93,0	85,1	S. ..	Clear.	,789	90,3	97,0	87,8	S ..	A few Cumuli.
15		,752	82,2	78,0	77,0	E. ..	Clear.	,817	86,5	90,4	84,9	S. ..	Cumuli.	,807	89,4	92,8	85,0	S. ..	Cumuli. Cloudy occasionally.
16	●	,740	80,0	74,3	74,2	S. ..	Cirro-strati.	,770	83,5	86,0	81,2	N E.	Cirro-strati.	,768	85,0	89,5	83,0	S. ..	Cloudy
17		,712	81,0	78,5	78,2	Calm.	Cirro-strati.	,778	84,5	90,3	82,5	S. ..	Cumuli.	,762	85,5	92,5	83,0	S. ..	Cumuli.
18		,752	83,0	81,6	81,2	S. E.	Cirro-strati.	,828	86,5	91,0	85,9	S. ..	Cumuli.	,802	89,5	94,5	86,0	S. ..	Cumuli.
19		,712	84,0	83,0	81,5	S. ..	Cirro-strati.	,778	86,5	89,2	85,0	S. ..	Cumuli.	,776	89,3	92,0	86,5	S. ..	Cumuli.
20		,709	81,2	77,0	77,0	E. ..	Cirro-strati	,786	87,0	89,5	85,0	S. ..	Cumuli.	,753	88,7	92,7	85,9	S ..	Cumuli.
21		,681	83,1	82,5	81,8	E. h S.	Cloudy.	,737	87,1	90,8	84,9	S ..	Cumuli and Haze	,722	90,1	93,5	86,5	S ..	Cumuli and Haze
22		,688	83,8	82,5	81,6	S. ..	Cirro-strati.	,712	87,9	90,8	81,2	S ..	Cumuli and Mists	,700	90,4	93,2	86,2	S. ..	Cumuli.
23		,707	84,0	80,9	80,5	Calm.	Cloudy.	,720	86,5	89,4	85,2	S. ..	Cloudy.	,710	88,7	90,3	84,3	S. ..	Cumuli and Haze.
24	(	,616	82,2	79,0	77,0	S. ..	Cloudy	,681	84,3	87,5	84,9	S. ..	Cumuli.	,670	86,0	89,5	84,0	S. E.	Cumuli.
25		,680	83,8	81,3	80,0	S. h W.	Cloudy	,711	86,7	89,5	83,5	S. ..	Cumuli.	,736	88,0	92,7	85,9	S. ..	Cumuli.
26		,676	81,2	78,0	77,0	E ..	Cloudy	,762	86,7	88,2	83,2	E. ..	Cumuli.	,744	87,0	89,0	84,0	E. h N	Cumuli.
27		,680	84,0	82,8	82,0	S. ..	Cloudy.	,750	87,6	90,0	85,8	S ..	Cumuli	,738	89,6	93,2	87,0	S. ..	Cumulo-stra and Nimbi
28		,680	81,3	76,8	75,9	Calm.	Cloudy	,730	86,0	89,0	85,3	E ..	Cloudy	,722	87,9	93,2	86,9	S. ..	Cumuli
29		,729	80,0	74,2	73,8	S. h E.	Cloudy.	,786	86,9	89,5	84,0	S. ..	Cumuli	,774	88,5	91,0	84,5	S ..	Cumuli,
30		,770	82,2	77,8	77,0	S ..	Cloudy partially	,801	86,2	89,0	84,9	S. W	Cloudy	,786	88,2	91,0	85,2	S ..	Cumuli
31	⊙	,720	82,3	78,0	77,5	Calm.	Cloudy	,756	86,0	89,3	85,0	S. ..	Cumuli.	,724	89,6	92,0	85,5	S. ..	Cumuli.
Mean.		29,724	81,5	79,1	78,2			,768	85,1	88,7	83,6			,755	87,4	91,7	84,7		

Day of the Month	Maximum Temperature observed at 2 h. 40 m.						Minimum Pressure, observed at 4 P. M.						Observations made at sun-set						Rain Gauge.	
	Barometer	Temperature. Of the Mercury	Of the Air.	Of an Evapg. Surface.	Therm. exposed to the rays of the sun.	Wind. Direction.	Aspect of the sky	Barometer.	Temperature. Of the Mercury	Of the Air.	Of an Evapg. Surface.	Wind. Direction.	Aspect of the sky	Barometer.	Temperature. Of the Mercury.	Of the Air	Of an Evapg. Surface	Wind. Direction	Aspect of the sky	Upper	Lower
1	29,424	82,8	82,9	79,7	....	....	Blowing a gale from the S., & drizzly occasionally.	29,424	84,3	83,0	79,9	....	Blowing a gale from the S. & drizzly occasionally.	29,420	83,0	82,8	79,5	.....	Blowg. a gale from the SW. with occas. mizg rain.	1,11	1,25
2	,720	85,8	87,6	84,0	....	S. ..	Detached Clds. occasl. sun-	,720	85,3	87,0	83,9	S. ..	Cloudy (ally.	,722	84,8	84,6	82,8	S.....	Light cir.-str. interspersed		
3	,711	87,0	92,0	84,9	121,5	S.....	Detached light Clds. [shine.	,710	87,0	89,8	84,0	S. ..	Cloudy	,718	86,9	87,2	82,9	S.....	Scattered Clouds.		
4	,672	87,1	90,0	82,8	111,0	S.....	Cumuli and Light Haze.	,666	86,8	88,6	82,5	S. ..	Light Haze & cum. cldy	,674	85,5	85,0	81,0	S.....	Cloudy on the Hor. [Gene-		
5	,718	86,9	91,2	83,2	....	S.....	Cloudy.	,700	86,7	90,8	85,0	S ..	Cloudy, [occasionally.	,709	86,0	87,5	82,5	S.....	Cloudy, [rally Clear.		
6	,720	84,0	86,8	83,0	....	N. W.	Nimbi Rain.	,720	84,5	87,6	82,0	S. ..	Cloudy,	,729	84,3	86,5	81,9	S.....	Cloudy	0,76	0,81
7	,702	83,5	89,5	83,6	....	S. W.	Cumuli	,702	83,2	88,5	83,0	S. W.	Cumuli.	,720	82,8	84,5	81,8	S. E.	Light Nimbi interpersed.	0,80	0,89
8	,746	86,4	93,5	84,9	124,1	S. E	Cumuli,	,730	86,6	90,0	83,0	S. E.	Cumulo-strati.	,736	82,5	86,8	82,0	S.....	Clear		
9	,790	87,7	93,0	84,0	123,9	S. ..	Cumuli.	,762	87,5	91,0	83,8	S. ..	Cumuli.	,770	85,9	87,0	84,9	S	To the N Cum-strati.		
10	,800	88,3	94,4	84,6	127,0	S. ..	Cumuli	,800	88,5	93,5	84,8	S. ..	Cumuli a few.	,809	86,8	88,5	83,0	S.....	Clear		
11	,804	86,5	98,5	86,9	130,2	W ..	Clear.	,790	86,5	97,0	85,9	W. ..	Clear.	,790	86,0	90,5	83,0	Calm.	Clear		
12	,757	88,2	102,5	87,2	140,0	N W.	Cumuli.	,744	88,2	99,2	86,2	N W.	Cumuli	,747	87,6	91,5	84,0	Calm.	Haze.		
13	,750	89,5	97,3	85,9	134,5	S. ..	To the N Cumulo-strati	,730	89,1	96,8	85,5	S. ..	Cum-strati	,739	87,5	90,0	84,2	S E	Generally Clear.		
14	,740	91,2	97,5	88,0	131,0	S. ..	Cum. str. Zenith Clear.	,719	91,1	95,2	86,0	S. ..	Clear.	,724	88,0	87,5	82,1	S. E.	To the N Cum.-str.		
15	,744	89,7	92,5	85,7	119,5	S. ..	To the N. Cumulo-strati.	,712	89,9	91,0	84,2	S. ..	Cloudy partially	,752	87,8	86,5	81,2	S.....	Cloudy and Hazy	0,31	0,34
16	,680	86,3	91,6	84,3	117,2	S ..	Cloudy, Cum-strati.	,562	86,3	90,0	84,0	E. ..	Cloudy.	,675	85,7	87,0	83,2	E. h N.	Cloudy.	1,31	1,54
17	,714	86,8	94,0	85,6	121,5	S. W.	Cumuli.	,700	86,1	90,2	84,8	S. ..	A few Cumuli.	,706	86,0	87,5	84,0	S. ..	Clear.		
18	,761	90,5	95,0	87,0	125,0	S. ..	Cumuli.	,752	90,0	93,0	85,5	S. W.	To the N. Cumuli	,743	88,5	88,9	83,0	S.....	Cirro-strati.		
19	,720	90,8	99,9	88,2	129,2	S. ..	Cumuli	,702	90,0	93,2	87,0	S SW.	Cumuli, Haze to the N.	,720	81,9	75,0	73,0	N E	Nimbi interspersed	0,32	0,37
20	,708	89,7	92,5	87,0	118,0	S. W.	Cumuli	,668	89,5	91,5	86,8	S. W.	Cumuli a few.	,674	86,3	88,0	85,2	S.....	Scattered clouds.		
21	,692	90,5	93,2	87,6	121,0	S. W.	Cumuli.	,674	90,5	92,9	86,5	S. ..	Cumuli a few	,680	88,0	88,2	82,4	S.....	Generally Clear.		
22	,642	90,4	93,0	85,9	115,0	S. ..	Cumuli.	,630	89,8	91,0	86,0	S. ..	Cloudy.	,642	81,5	76,0	75,2	N E	Nimbi interspersed.		
23	,656	88,9	91,0	84,8	111,5	S. ..	Scattered Clouds & Haze.	,650	88,0	88,8	83,5	S. ..	Cloudy.	,670	86,6	86,7	83,2	S.....	Cloudy Thundering.	0,69	0,77
24	,630	88,5	92,6	84,6	116,0	S. ..	Cumulo-strati.	,610	87,5	87,6	84,0	S. ..	Cumuli	,616	85,8	86,5	83,5	S	Cirro-strati.		
25	,690	89,2	93,0	87,3	....	S. ..	Cloudy.	,666	86,0	86,2	81,8	S. E.	Nimbi (Showery.)	,674	83,2	81,0	80,0	S. E.	Nimbi Thunder.		
26	,722	87,0	93,0	86,0	115,2	E. ..	Cumuli & partial Haze.	,700	87,0	93,0	86,0	N. E	Hazy	,708	85,5	87,0	83,9	N E.	Cloudy.	0,65	0,74
27	,686	90,7	93,2	85,5	115,0	S. ..	Hazy and Cum.	,654	90,3	92,1	85,0	S. ..	Clear.	,658	87,2	88,0	81,5	S	Cloudy to the N W.		
28	,700	89,6	93,5	85,0	127,0	S. ..	Few Cumuli.	,680	89,0	92,5	85,5	S. E.	Generally Clear.	,700	85,5	87,2	83,0	S.....	A few Scattered Clouds.	0,74	0,80
29	,732	90,0	93,0	81,0	119,0	S. ..	Clear.	,716	89,8	92,0	83,0	S. ..	Clear.	,720	87,0	87,9	82,8	S.....	Cirro-strati [Light]	0,39	0,43
30	,758	88,9	82,0	84,4	116,9	S ..	Cumuli.	,702	88,8	91,2	84,0	S. ..	A few Cumuli.	,712	85,6	86,8	82,5	S.....	Cum. str. on the Horizon.		
31	,708	90,0	94,0	86,0	124,0	S ..	Cumuli.	,670	89,5	92,0	85,0	S W.	Generally Clear.	,671	87,7	88,0	82,5	S.....	To the N.&N.E. Cum. str.	0,05	0,08
Mean	,711	88,1	92,9	85,1	121,8			,693	87,8	91,2	84,1			,701	85,7	86,3	82,1			7,19	8,05